



**REPORT**  
**ON**  
**SEED MULTIPLICATION SCHEMES**  
**(MADRAS)**

**COMMITTEE ON PLAN PROJECTS**  
**(*Seed Multiplication Team*)**

सत्यमेव जयते

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## PREFACE

The Committee on Plan Projects, Planning Commission, Government of India constituted the Seed Multiplication Team in COPP/(6)/1/59, dated 10th May 1960. The Terms of Reference communicated to the Leader on 30th June 1960 were :

I. To make an appraisal of the various seed schemes in existence and make such suggestions as it may consider necessary having regard to the following :

(a) Sufficiency of the programme from the point of view of the need of the country for the supply of pure seed of improved varieties.

(b) Comparative economics of various types of Schemes with a view to better programming and planning for the future.

(c) Priorities of the programme and its phasing in relation to the needs from time to time.

(d) Progress of work under various types of schemes selected at random and the causes which may hamper or impede progress and the remedies for them.

(e) Effectiveness of distribution arrangements at various stages for supplying pure seed to the farmers.

(f) The extent of trading operations carried on by the Agricultural Department for the supply of pure seed to the cultivators and the necessity of employing technical officials for undertaking these trading operations.

(g) Coordination among different agencies engaged in breeding, production and distribution of pure seeds.

(h) Any other point that may be considered relevant to the objectives for which the Seed Multiplication Team has been appointed.

II. To employ the method of case studies and flow sheet analysis in making the studies and to consult local interests in the area which the Team visits in order to make an assessment of the acceptability of the programmes which are being implemented for the benefit of the persons concerned.

III. To discuss the results of the Team's analysis with the persons engaged on the programme and their controlling officers.

This report of the Team of the Madras State is the Second of a series being issued. For increasing food production, improved seeds occupy a prominent place. In Madras, crop sampling experiments during 1958-59 showed that the increase due to improved strains of paddy

alone was 255 lb. per acre or 12 per cent. Besides, many of the improved varieties respond to increased manuring resulting in still higher yields.

The Team visited the districts of Coimbatore, Thanjavur, South Arcot, Chinglepet, Ramanathapuram and Tirunelveli for ten days in July, 1960. Important agricultural stations and a number of State Seed Farms were visited and discussions held with cultivators, officers of the Agricultural Department, Cooperative interests and Block Development staff. A list of places visited and interests contacted are given in Appendix XI. The case studies of Agricultural Stations are given in Appendix XII, and of State Seed Farms in Appendix IX.

Arrangements were made for the work of the Team by the Director of Agriculture. This report is based on the study of the Team during its visits and on the extensive data received from the Agricultural Department. A special discussion was also held with the Director of Agriculture at Madras and with the Dean of the Agricultural College and Crop Specialists at Coimbatore.

We take this opportunity of conveying our thanks to Shri M. Bhakthavathsalam, Minister for Agriculture, Madras, for his interest and help in the Team's work. We are also indebted to Sarva Shri A. Venkatesan, Director of Agriculture now Secretary, V. Karthikeyan, Director of Agriculture, Obaidulla Shah, Joint Director of Agriculture (Seed Farms), Dr. S. Krishnamurthy, Dean of the Agricultural College and Research Institute and to the several officers of the Agricultural Department for valuable cooperation and services rendered. Dr. K. Ramiah, Adviser to the Team gave valuable assistance in its enquiries and in the preparation of this report.

(Sd.) DR. R. NAGAN GOWDA,

*Leader.*

(Sd.) SHRI THAKUR PHOOL SINGH,

*Member.*

(Sd.) DR. BOSHI SEN

*Member.*

(Sd.) DR. B. P. PAL,

*Member.*

(Sd.) S. N. VENKATARAMANAN,

*Senior Research Officer and Secretary*

## CHAPTER I

### CROP PATTERN AND SEED REQUIREMENTS

#### (1) *Crop Pattern :*

The area under crops in the Madras State during the year 1958-59 was 17 million acres of which rice occupied the largest area of 5.7 million acres, cholam 1.7 million acres, cumbu 1.2 million acres, ragi 0.9 million acres and total cereals 10.8 million acres. Pulses occupied a relatively small area of one million acres. Oil seeds occupied 2.2 million acres largely contributed by groundnut (1.05 million acres) and gingelly (0.4 million acres). The share of cotton was 1.1 million acres.

The Madras State has about seven per cent of the all Indian area under rice, four per cent of jowar, four per cent of cumbu (bajra), 14 per cent of ragi, seven per cent of oil seeds and five per cent of cotton.

The rainfall of the State is received largely from two monsoons; the South West Monsoon from June to September and the North East Monsoon from October to December. The average rainfall is given in Appendix II for different districts. The cropping pattern is determined by the relative intensity of these two monsoons. The precipitations during the two monsoons are more or less equal in Kanyakumari, while the South West monsoon is slightly more than the North East in Salem and North Arcot, and very much more in the Nilgiris. This makes it possible in the plains for early sowing of ragi, groundnut, cumbu and gingelly and in the hills, potatoes. In all other districts the North-East Monsoon precipitation is more than the South-West, being markedly so in Tanjore, Chinglepet, S. Arcot, Tirunelveli and Ramanathapuram. Here late rainfed crops as jowar and cotton and late ragi predominate. The average total rainfall in different districts ranges from 700 mm. in Coimbatore, around 800 to 900 mm. in the districts of Ramanathapuram, Tirunelveli, Madurai, Salem and Tiruchirapalli. The average rainfall was highest in the Nilgiris (1880 mm.) followed by Kanyakumari (1470 mm.), Chinglepet (1290 mm.), S. Arcot (1180 mm.), Tanjore (1140 mm.) and N. Arcot (970 mm.). The supply of water in the canals, tanks and wells is determined by the amount of rainfall of these regions.

A comparatively large proportion of the cropped area in Madras State is irrigated namely 32 per cent; the percentage irrigated by canals being 36 per cent and by tanks 40 per cent.

Among crops, the area irrigated was 100 per cent of sugarcane, 90 per cent of rice, 45 per cent of ragi, 25 per cent of cotton and jowar, and 10 per cent of groundnut.

(2) *Requirements of Improved Seed of the Madras State:*

Based on the variable seed rates for rainfed and irrigated crops, the requirements of seed for covering the area every year are roughly as follows :—

*Area, Production and Seed requirement of Crops*

Crop	Area (000 acres)	Production (000 tons)	Seed requirement to cover the area (000 tons)
Paddy . . . . .	5,712	4,922	106.8
Cholam (jowar) . . . . .	1,846	516	9.2
Cumbu . . . . .	1,500	301	4.4
Ragi . . . . .	889	325	3.4
Tenai . . . . .	70	20	0.3
Varagu . . . . .	646	247	1.7
Other Millets . . . . .	627	125	2.5
Groundnut . . . . .	1,840	900	66.7
Gingelly . . . . .	838	36	0.5
Caster . . . . .	43	4	0.2
Cotton . . . . .	1,123	..	6.9
Sugarcane . . . . .	120	..	360 setts.
Horsegram . . . . .	638	52	3.5
Redgram . . . . .	123	24	0.5
Bengalgram . . . . .	5	2	0.1
Greengram . . . . .	91	9	0.6
Blackgram . . . . .	94	13	0.6
Others . . . . .	157	15	0.2
Potatoes . . . . .	23	..	16.1

## CHAPTER II

### RESEARCH

#### (1) *Agricultural Research Stations*

In Madras there were 22 Agricultural Research Stations and Farms during the year 1958-59. The main research work is done by Crop Specialists in the Agricultural Research Institute at Coimbatore, under the Dean of the College and Additional Director. Here Crop Specialists work in their lands for paddy, millets and pulses and cotton. These are the main stations where intense fundamental research work on crops is undertaken. The Oil Seeds Specialist at Coimbatore has a main station at Tindivanam (South Arcot) with a sub-station at Pollachi. The Millet Specialist at Coimbatore has sub-stations at Tirupattur (North Arcot district) and Ariyalur (Tiruchirapalli district). The Cotton Specialist at Coimbatore has sub-stations at Srivilliputtur (summer cotton) and Periakulam. The Sugarcane Specialist has headquarters at Cuddalore (South Arcot) and is also incharge of the regional sugarcane farms.

The Agricultural Research Stations in the districts are under the control of the Deputy Directors of Agriculture, but the Crop Specialists have their own staff in these stations, working on their particular crops.

#### (2) *Sufficiency of Breeder Programme.*

The Madras State has so far evolved 73 improved strains of paddy, 24 of cholam, 9 of cumbu, 10 of ragi, three in tenai, two in varagu, one each of pannivaragu and samai in respect of cereals. Out of these only 38 strains of paddy, 13 of cholam, and all the strains of other cereal crops are now being multiplied for distribution. Four strains each of groundnut and castor, and three of gingelly so far evolved are being multiplied. In pulses, one strain each in redgram, horsegram and bengalgram and three varieties of sugarcane are being multiplied (C. F. Appendix I).

High yielding rice strains suitable for 90 per cent of the total rice area have been evolved. But improved rice strains have not yet been evolved for about five lakh acres which are inundated or are alkaline.

For the major rainfed cholam areas under Periamanjai and Irungu and for irrigated cholam in the Central and Southern Zones, strains have been evolved giving higher yields than local, and adaptability to different sowing conditions, giving good fodder or quality of grains, but suitable strains have not been evolved for the smaller jowar growing regions raising varieties like Talavirichan (Open headed varieties). There is no suitable variety of jowar for rainfed areas, as was observed



during visits to Madurai and Ramanad districts. The present evolved strains in cholam can cover roughly 80 per cent of the crop area. Improved ragi strains can cover roughly 75 per cent of the total area. In cumbu (bajra), the hybrids and the evolved pure strains can cover the entire area. The position is however different in the case of small millets where only a beginning has been made with one or two strains for each crop. The Team therefore recommends a breeding programme to evolve high yielding strains of varagu, samai and other millets for 1.2 million acres.

In pulses, the supply of improved strains is also inadequate. One strain each has been evolved for redgram, bengalgram and horsegram, and allowing for a fair spread in these, improved strains of pulses have been evolved, which are suitable for only 80 per cent of the area. The Team therefore recommends an intensive breeding programme to evolve suitable pulses for the other half.

Although no strain has been evolved for Red Pollachi variety of groundnut, it can be replaced by 110 day's TMV 2 (bunch). Suitably multiplied, the existing four strains are adequate to cover the entire area. However, multiplication of the spreading varieties (TMV 1, 3, 4) presents difficulties as the multiplying rate for this rainfed crop is low (1:5). There are two strains of castor, one non-debiscant, more or less suitable for the whole area, and three strains of gingelly suitable for practically the entire area of that crop for summer irrigated or monsoon or for cold weather sowings.

The position in cotton with regard to improved strains is satisfactory. The irrigated area can be covered fully by MCU 1 as a winter, and MCU 2 as a summer crop, while the strains K 5 can cover the entire Coimbatore Zone, and K2 the Southern Zone for rainfed crops. Except for a negligible area under the perennial variety Hadam (4000 acres) the entire cotton area of 1.1 million acres can be covered by improved strains. Two newly released strains MCU 3 (Pongal) for the winter irrigated area, and K 6 (Pandyan) for the rainfed areas are reported to be suitable for the whole area. Work with the main object of increasing the yields and improving the lint quality to fully 1" in rainfed cotton and 1 1/16" in irrigated cotton is also well underway. Punjab 216F with short duration is suitable for rice fallows.

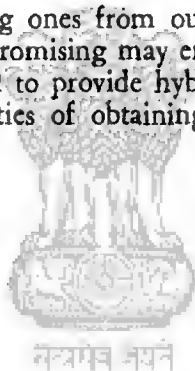
In sugarcane three varieties CO 419, 449 and 527 practically cover the entire area of 1,20,000 acres. The main object is to have early mid-season and late varieties to suit factory areas, and a high tonnage jogger for the rest. Further now releases CO 658 and 765 are also promising.

In potatoes, one variety Great Scot known for four decades is considered fit for the whole area of 23,000 acres.

On the whole, the evolution of strains in the Madras State has progressed to give a cent per cent coverage in cotton, sugarcane, groundnut and potatoes, 90 per cent in paddy, 70 to 80 per cent in major millets and less than 50 per cent in minor millets and pulses.

### (3) *Research* .

Plant breeding research is satisfactory in Madras but greater intensification is needed on work with minor millets and pulses; and to some extent in cholam for obtaining suitable types for rainfed areas. In paddy also a greater intensification of breeding work is called for to get cosmopolitan types like TKM 6. Such intensification can also lead to considerable reduction in number of varieties. With regard to the 10 per cent of the area in Madras under special conditions for which suitable paddy strains have so far not been evolved, a selection programme in the local varieties can be undertaken to begin with to give out some useful types, until such time as new varieties become available. Even in existing varieties, a statewide varietal trial may be conducted by including some outstanding ones from outside the State. As a result of such a trial something promising may emerge. In cumbu the hybrid scheme should be enlarged to provide hybrid seed for as large an area as possible. The possibilities of obtaining hybrid sorghum will also have to be exploited.



### CHAPTER III

## SUFFICIENCY OF THE NUCLEUS, FOUNDATION AND REGISTERED SEED PROGRAMME

### (1) *Planning of seed multiplication*

The object of large scale production of pure seed is to saturate the coverable area under each crop in three to five years depending on the extent of self-pollination. If the extent of self pollination be taken as 98, 95, 90, 70 and 50 per cent., the ultimate purity in randomnating free from mixture or contamination can be shown to be 96, 90·5, 82, 54 and 33·3 per cent respectively. Replacement will be required more frequently in the partially cross pollinated plants as arhar, cotton, open-headed sorghum, and less in the wholly self pollinated crops like paddy, compact headed sorghums, wheat, gram, blackgram and greengram. In the case of cotton seed, where purity commands a high promise, ryots go in for renewal often and their spread in fresh areas is thereby retarded. The village farm ryot or registered grower does not part with all his produce for seed purposes. In the largely or purely cross pollinated plants like bajra and maize, annual replacement may be necessary for hybrids evolved.

### (2) *Estimate of actual quantities distributed from Village Seed Farms (Paddy) :*

In order to assess the quantities actually distributed from Village Seed Farms, a survey was conducted by the extension staff (Agriculture) in 21 block and non-block areas, under the instructions of the Madras Government. The results are given in Appendix III.

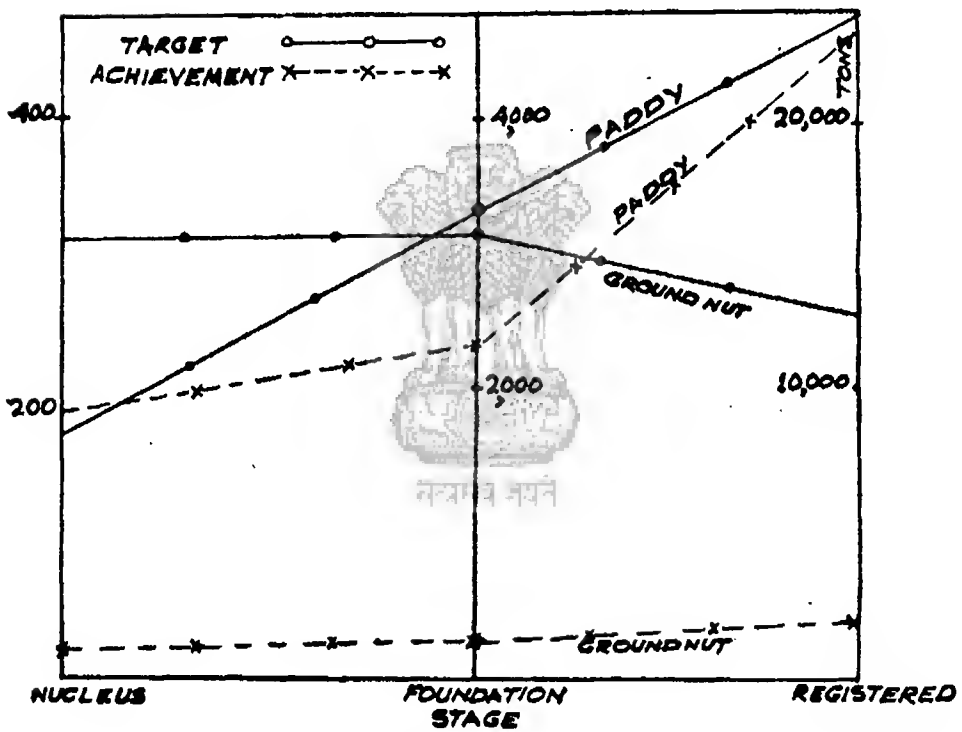
It will be seen from Appendix III that the Village Seed Farm ryot after meeting his needs gives only 42 per cent of his produce, for seed purposes in the case of paddy. A similar allowance has to be made for other crops also and is taken as 50 per cent.

Allowing for this and a replacement of the quantity given in table on page 2 once in four years for self-pollinated crops and once in three years for others and continuing the cycle every year the quantities of registered seed (Village Seed Farms), foundation seed and nucleus seed required annually are estimated in the following table, and the sufficiency programme for each crop is discussed in the next page.

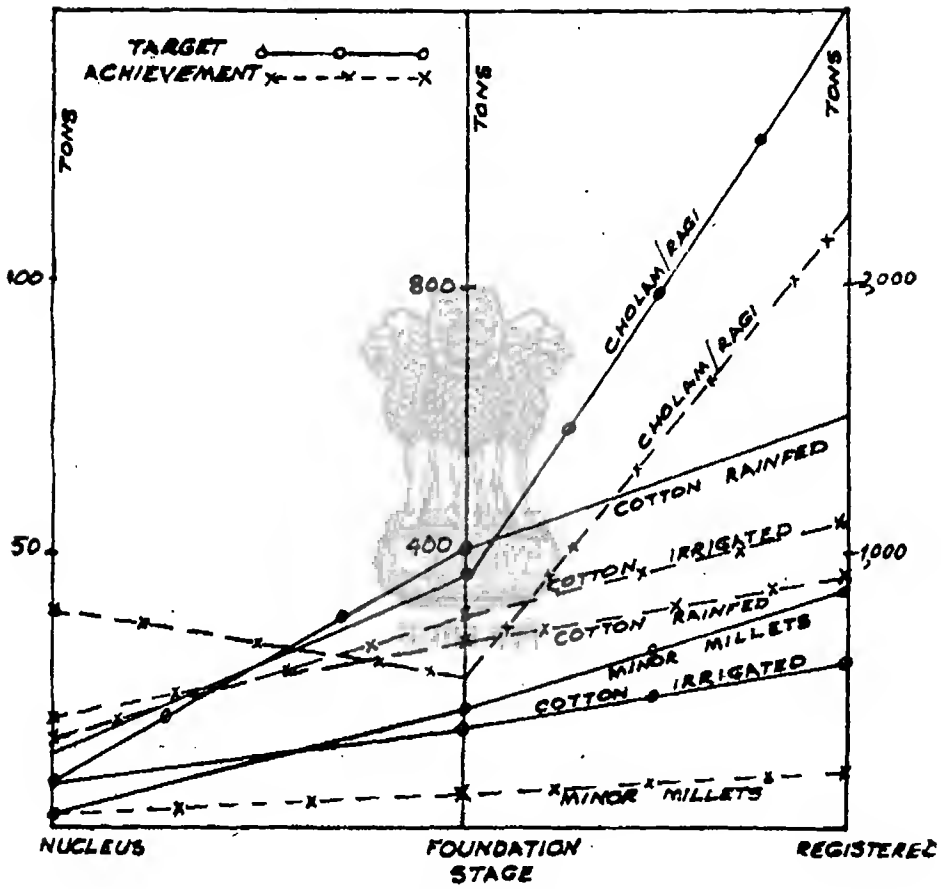
*Requirements of nucleus, foundation and registered seed for a sufficiency programme in Madras State (tons)*

Crop					For registered seed	For foundation seed	For Nucleus or breeder seed
Paddy	{ Irrigated	.	.	.	20500	2000	100
	{ Rainfed	.	.	.	3500	700	70
Sorghum	{ Irrigated	.	.	.	750	75	1.5
	{ Rainfed	.	.	.	1700	200	8.0
Cumbu	{ Irrigated	.	.	.	270	27	0.5
	{ Rainfed	.	.	.	1100	140	6.0
Ragi	{ Irrigated	.	.	.	500	50	1.3
	{ Rainfed	.	.	.	400	50	2.5
Minor Millets	.	.	.	.	800	80	3.0
Redgram	.	.	.	.	160	20	1.5
Green Gram	.	.	.	.	150	40	2.0
Horse Gram	.	.	.	.	900	240	12.0
Other pulses	.	.	.	.	125	30	1.5
Groundnut	{ Irrigated	.	.	.	1000	250	25
	{ Rainfed	.	.	.	12000	2400 1200 (2 stages)	240
Gingelly	.	.	.	.	150	15	0.7
Castor	.	.	.	.	..	10	0.5
Cotton	{ Irrigated	.	.	.	730	150	10.0
	{ Rainfed	.	.	.	1560 stg.I 400 stg.II	100	10.2
Sugarcane Tons Setts.	.	.	.	.	..	70,000	..
Potatoes	.	.	.	.	..	3,750	..

**TARGETS AND ACHIEVEMENTS IN SEED MULTIPLICATION**  
**(FLOW SHEET FROM NUCLEUS TO REGISTERED SEED**  
**DISTRIBUTION) TONS 1959-60.**



(Fig. No. 1)



(Fig. No. 2)

From the above table the sufficiency of the seed programme for each crop is discussed below : (C. F. diagram).

(i) *Paddy*.—

Quantity received	Reg. seed	Found. seed	Breeder seed
Tons. Total . . . . .	24000	2700	170
• For irrigated . . . . .	20500	2000	100
For unirrigated . . . . .	3500	700	70
Quantity achieved . . . . .	2375	1715	180

Two-thirds of requirements of foundation seed have been met in 1959-60 and as the quantity distributed is increasing every year, the requirements will be more or less met by the end of the Second Five Year Plan, as can be seen in the following table :

*Quantity of paddy seed distributed (tons) by the Agricultural Department, (Madras)*

	Foundation seed Seed Farms	Registered seed (Village seed Farms)
1956-57 . . . . .	290	7960
1957-58 . . . . .	1280	17706
1958-59 . . . . .	1727	15586
1959-60 . . . . .	1715	23182
Plan target . . . . .	2650	23500
Estimated annual requirement for replacement once in 4 years . . . . .	2700	24000

(ii) *Millets*.—For breeder seed the supply position in millets is adequate, except for the small millets.

*Breeder seed (tons)*

	Required	Produced (1958-59)
Cholam . . . . .	9.5	27
Cumbu . . . . .	6.5	5.7
Ragi . . . . .	3.8	15.0
Other millets . . . . .	8.0	0.7
TOTAL . . . . .	27.8	48.4

The quantities distributed in the foundation and registered stage are available, for millets as a whole.

*Quantity of foundation (primary) and registered seed of millets distributed (tons).*

Year	Foundation	Registered
1956-57 . . . . .	31	275
1957-58 . . . . .	137	1254
1958-59 . . . . .	164	1134
1959-60 . . . . .	230	2207
Plan target . . . . .	500	2300 (for major Millets)
Requirements according to this survey . . . . .	630	5500 (for all millets)

The supply of foundation seed of millets is only 40 per cent of the total requirements mostly due to inadequacy of strains suitable for all areas, particularly for small millets. The shortage exists also in registered seed, where only 40 per cent of requirement is covered.

(iii) *Pulses*.—Against a requirement of 17 tons of breeder seed only 2½ tons of strains of red gram, horse gram and bengalgram were produced in 1958-59. Details regarding quantities of foundation and registered seeds are not available but the programme is only on a small scale.

(iv) *Oil Seeds*.—(a) *Groundnut*.—For a broad based programme to cover the groundnut area once in five years, quantity of breeder seed required in 260 tons, and the supply in 1958-59 was only 36 tons. The State seed farms produced 54 tons of foundation seed, while distribution of all registered oil seeds, was only 900 tons against a sufficiency programme of 15,000 tons. This is due to the fact that the rate of multiplication of spreading varieties which are largely grown in rainfed areas is only 1 to 5. The produce from the irrigated crop of this variety is not good for seed. Procurement was also small due to fear of losses on the part of the district staff, as the seeds had to be sold at cost prices plus charges. The seeds of spreading varieties have a dormant period of two to three months. Therefore produce of irrigated crop cannot be used immediately for seed purpose in the rainfed area. Recent experiments have shown that this dormancy can be broken by raising the



storage temperature to 40°C or by treating with extract of dormant stems. Recent price fixation programme to sell the seed at market rates is expected to improve procurement from 1960-61 onwards.

For seeds of the bunch groundnut (NW 2) which is irrigated, no difficulties in multiplication exist. The total coverage is reported at about 28 per cent for all groundnut. The wide gap between requirements and procurement can only be met by an increase in supply of foundation seed and an intensive procurement programme at the registered seed stages which may necessitate one more step of multiplication.

The area under rainfed groundnut is 1.7 million acres or 95 per cent of the area under that crop. The seed of spreading variety produced under irrigated condition is not taken by the ryots. Hence it is recommended that steps may be taken to evolve a separate strain for rainfed area to overcome the above difficulty.

(b) *Gingelly*.—The breeder seed position is adequate with an achievement of 1.4 tons against the requirement of 0.7 tons, but more procurement and distribution is necessary to cover the total area.

(c) *Castor*.—The supply of breeder seed is adequate being half a ton. The progress is satisfactory as 72 per cent of the area has been covered.

(v) *Cotton*.—Seed multiplied in the state cotton scheme for distribution amounted to 1042 tons for irrigated and 895 tons for rainfed crop against a sufficiency programme of 730 tons and 1560 tons required to cover the area once in three years. The target of seed production for full coverage by the end of Second Five Year Plan has more or less been achieved but the area covered has remained stationary at 7 lakh of acres. While 90 per cent of the irrigated area has been covered, only 54 per cent was covered for the rainfed crop. An intensive programme for the latter is necessary.

(vi) *Sugarcane*.—For replacement by disease free sugarcane setts once in five years it would require about 70,000 tons of setts. The factories play an important part in multiplication as they enter into contract with growers for producing setts by short cropping. The position can be considered satisfactory as practically the whole area under cane is now under improved varieties.

### (3) *Planning for multiplication of individual varieties of paddy*

It is necessary that the planning of seed distribution takes into consideration the demand for each improved strain of each crop. After the pilot survey of improved strains of paddy during 1958-59 a programme for 1959-60 was drawn up for each strain and the nucleus seed

distributed to seed farms. The strain-wise distribution of nucleus seed to state seed farms, against the target was as follows :—

*Percentage distribution of nucleus seed of each strain of paddy against the target of Seed Farms (1959-60)*

Name of strain	Percentage nucleus seed distributed to Seed Farms	Percentage of area proposed for Seed farms
Co.25 . . . . .	21.8	27.8
TEM.6 . . . . .	14.2	11.5
Adt.20 . . . . .	4.6	7.7
Adt.3 . . . . .	4.8	5.1
ASD.5 . . . . .	10.0	12.7
GEB.24 . . . . .	8.2	6.7
X.6538 . . . . .	7.9	2.0
ASD.1 . . . . .	5.3	0.9
Co.19 . . . . .	2.3	2.4
Co.13 . . . . .	2.8	2.9
Adt.8 . . . . .	4.3	8.1
SR.261B . . . . .	3.9	0.3
ASD.11 . . . . .	2.5	3.8
BAM.3 . . . . .	2.4	1.8
Adt.22 . . . . .	1.1	1.6
Co.2 . . . . .	0.9	1.7
Others . . . . .	2.5	5.0
	100.0	100.0

Quantity of Nucleus  
Seed distributed

Area planned for  
Seed Farms 2340 acres

It will be seen that there is a fairly close correspondence between the nucleus seed distributed and the planned area under seed farms for each strain of paddy.

## CHAPTER IV

### COVERAGE BY IMPROVED STRAINS

#### (1) *Estimated area under improved strains*

The estimated area under improved strains of crops by departmental and natural spread is published every year in the annual administration reports of the Madras State. The figures given here are only approximate, based on the seed issued and also local knowledge of natural spread through enquiries and observation by the district staff, supplemented by information from the seed development staff, carried on from year to year. To judge the accuracy of the existing information a pilot survey, by random sampling of villages and holdings was conducted for paddy in 1958-59, and for millets in 1959-60. Against an estimate of 63 per cent spread of improved varieties for rice in 1958-59 and 43 per cent for cholam in 1959-60 according to this survey, the departmental figures were 54 per cent for rice in 1957-58 and 51 per cent for cholam in 1958-59. The official figures may therefore be considered broadly indicative of the true position in these crops.

The area under improved strains for different crops as estimated by the Department for the two years 1957-58 and 1958-59 since the reorganisation of the State is given in Appendix IV.

#### (2) *Pilot Survey of the coverage of improved strains*

The question of having a pilot survey for determining the coverage by improved varieties has been engaging the attention of the Government of India and the States. In Madras the method employed for such a survey done for rice in 1958-59 is given in Appendix V.

The Team recommends that survey on suitable lines with improved methods of sampling be conducted for the coverage of improved strains for all major crops in all districts. It is possible to cover all major crops by taking one village sample for every 3,000 acres of the total cropped area in each district.

#### (3) *Area under improved strains for individual crops*

*Rice.*—By weighting the percentage area under each improved strain, to the area of each district from the survey data, the table in Appendix VI shows the position of coverage of the more important improved strains during 1958-59.

Although over 73 strains have been evolved, the first four of them GEB 24, CO 25, CO 19 and DAM 3 accounted for two-thirds of the area covered by all strains, and 40 per cent of the total rice area. This

is because GEB 24 is a fine cosmopolitan variety suitable for different seasons and districts, CO 25 is a heavy yielder resistant to blast, CO 19 is a good yielder and BAM 3 is a fine variety and suitable as a short crop in different seasons for semi-dry areas or those with limited water supply.

*Cotton.*—The coverage by varieties of improved strains is estimated by the cotton research staff as shown in Appendix VII.

Of the irrigated cotton area of about 250 thousand acres, 225 thousand acres or 90 per cent has been covered, and of the rainfed area of 8,70,000 acres, 54 per cent was covered.

*Sugarcane.*—Of the total area of over 1,20,000 acres under cane, it is estimated that CO 419 occupied 82 per cent, CO 449—12 per cent and CO 537—about 4 per cent of the area. The new releases CO 658 and CO 685 are under multiplication.

It appears that the estimated area under improved strains is 25 per cent in the case of minor millets, 28 per cent in the case of groundnut as well as pulses, etc., 50 per cent in the case of Sorghum. In the case of paddy, the estimated coverage is a little over 50 per cent. The only crops where coverage is substantial or full are sugarcane and irrigated cotton. Even in the case of unirrigated cotton it is 54 per cent only.

#### (4) *Economy and efficiency in the number and use of strains*

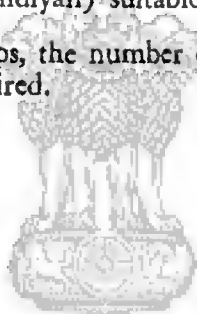
The question has been raised whether it is possible to reduce the number of strains required to a few only. The problem arises in Madras only in the cases where 38 strains of rice and 12 in cholam are under multiplication. Rice in Madras, is raised under a variety of conditions of assured as well as uncertain water supply. The major canal irrigated areas as Thanjavoor have three seasons, early first (Kuruvai) followed by a late double crop (Thaladi), and a long duration single crop (July-January). At the end of the canals, strains suitable for late planting are necessary for both early and late crops, and strains to suit limited water supply or semi-dry conditions are also necessary as BAM 3. Resistance to blast is a serious problem in the main-crop for which strains like CO 25 are necessary but as the quality of rice is not good, new strains like 6538 have been found necessary. For well-irrigated areas, cosmopolitan dry-neutral early types are required. A programme with CO 13, ADT 3 or TEM 6 for early or short crops, GEB 24 for different seasons, CO 19, ASD 5 for the main Samba crop, CO 25 or 6538 in blast areas and BAM 3 for semi-dry conditions will cover the bulk of the ryots' needs for the general state programme, although it may be necessary to have some more strains to cover saline areas, and where uncertain seasonal conditions necessitated early or late planting.

In cholam, conditions are different in the districts especially for the rainfed areas. Strains are required for each of the main regions growing varieties as Periamanjai (big Yellow), Chinnamanjal (small Yellow), Chitrai Cholam (Summer irrigated) Talavirichan (open headed), Irungu (black open headed), besides special selections for fodder or fodder-cum-grain needs and for drought resistance. It is possible that the number may be reduced to about ten.

The sugarcane factory requires a long period of crushing and therefore varieties of sugarcane are required for early mid-season and late planting. For gur making with good yields, CO 419 meets the entire need, covering about 88 per cent of the total. One variety for adsali or off season is necessary. The present requirement of improved varieties is fully met by three selections.

For winter irrigated cotton it may be possible to reduce to one variety, with the new introduction MCU 3. The two strains for rainfed areas K3 in the South-West and K2 in the South are likely to be replaced by the superior K6 (Pandiyan) suitable for both areas.

In regard to other crops, the number of strains is small, and more or less the minimum required.



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## CHAPTER V

### QUALITY IN SEED

#### (1) *Breeder Seed*

For maintaining identity and purity of the strains evolved, primordial nucleus seed raised from selfed single plants is sown in lines, and the progeny watched for purity of vegetative, and in cases like cotton, groundnut, some quantitative characters. In addition Botanical herbarium specimens are also maintained in Madras and also register of improved strains.

The method adopted in producing nucleus seed in Madras is given in Appendix VIII.

The extension staff and the Seed Development Officers mentioned in Chapter VIII place indents with the Crop Specialists for the quantities of different strains of nucleus seed required. The indents of the extension staff are based on the targets fixed for each crop for seed procurement under the five year plan and approved by the Director and Government for the major crops as paddy, millets, cotton, oilseeds etc., to saturate the cropped area with a period of four to five years.

#### (2) *Foundation Seed*

Seed now produced in State Seed Farms is tested for purity and viability by the extension staff and also independently checked by the Seed Development Officers and staff now stationed in the four regional offices of the Deputy Directors. Normally a purity of 98 per cent for paddy and a germination of 97 per cent for cotton a purity of 97 per cent and a minimum germination capacity of 78 to 80 per cent are considered suitable and the stocks that are below standards are rejected. In the case of cotton seed, duplicate samples are sent to the Professor of Botany in the Agricultural College to check the result of viability tests conducted by district staff. Tetrasclium bromide test is used for quick determination of viability and the test is useful for paddy and cotton only and gives satisfactory results. Germination registers are kept by the district staff in the seed depots. Periodical tests are also done and the Seed Development Officers give a monthly return of such check tests conducted in their monthly reports. Produce from seed farms is also tested and only those stocks which have the required purity and germination are sent to the Registered Seed Growers. About 400 paddy samples in a year can be tested by a Seed Development Officer and one Assistant.

### (3) *Registered Seed*

Seeds produced by the Seed Farm ryots who are called Registered Growers are tested for purity and germination and if found satisfactory the bags are sealed. While roguing is repeatedly done in the foundation stage roguing operations are less frequent in the registered stage. The Seed Development Officers watch the roguing of crops in all the seed farms and arrange for roguing of registered seed farms wherever necessary during their inspections. The District Agricultural Officers also inspect the crops and order roguing whenever required on the fields of the Registered Growers and in State Seed Farms. In cotton the entire inner area is thoroughly rogued while only a rapid roguing is possible at the later multiplication stage on examination of the crops. In paddy the ryot is paid a subsidy of 50 naye paise per bag of 160 lb. for maintaining purity and 12 naye paise as sealing charges; but this is not being availed of by the seed farm ryots either because they do it for prestige or because they are not willing to undertake the procedure of maintenance of registers for audit purposes.

### (4) *Extent of purity of improved seeds distributed*

The Village Seed Farm ryots *i.e.*, Registered Growers distribute the tested seed they produce by exchange or cash to other ryots and occasionally at the meetings when exchange takes place distinguished personages and officers are also present. In order to assess the quality of the paddy seed issued from State Seed Farms and Village Seed Farms (registered) a survey was conducted in 1960, at the instance of the Madras Government as stated before, and the results of purity and germination tests were as follows :—

#### *Average purity and viability of paddy samples of Village Seed Farm and State Seed Farm seeds (Madras)*

	No. of samples	Purity per cent	Germination per cent
State Seed Farms	45	96.6	97.2
Village Seed Farms	14	98.3	96.6

The purity was determined on the basis of presence of other varieties. Though the number of samples is small the results do indicate that in purity and germination, produce of the Village Seed Farms is as good as that of the State Seed Farms. Some ryots buy seed only from the Department in preference to other ryots, but the survey indicates that there need be no prejudice against Village Seed Farm stock.

### (5) *Case studies*

The Team also had occasion to inspect some records in a few depots. At Kallupathi block, the germination noted in paddy was 95 per cent, in cholam 75 per cent and in Varagu 60 per cent while germination in groundnut was not tested. In the Pongannur block the records showed the following germination :

	Breeder Seed	Foundation Seed
Cholam CO 13 . . .	45 per cent.	MCU 169 per cent.
Cholam CO 12 . . .	87 per cent	MCU 72 per cent.
Cholam CO (1957) . .	73 per cent.	

At the time of the Team's visit no seed was rejected. It is, therefore, suggested that more attention towards the aspect of purity and germination may be paid.

### (6) *Maintenance of quality of seed*

At present there is a working method of checking purity and viability, but genetic identity is tested only by the breeder. In self fertilised crops like paddy and groundnut, it is easier to maintain purity. But, the possibility of a small percentage of admixture is always there even in the breeder and foundation stages. Therefore, efforts should be made to reduce the percentage of admixture to the absolute minimum. Freedom from chaff and inert matter can also be achieved by paying greater attention than now to cleaning of the grain after threshing. Provision of additional equipment for cleaning grain such as vinnower, grain sorter etc., in the seed farms could be effective. Maintenance of viability under storage depends on the moisture content of the seed before storing and the methods of storage adopted and the receptacle used. This becomes important when the storage synchronises with unsuitable climatic conditions. It is, therefore, necessary to keep in view all the above factors to maintain quality of the seeds to be distributed in all stages.

### (7) *Seed Testing Laboratories*

An ideal arrangement to ensure that the seed used is of good quality is to draw up definite specifications for seeds at various stages of multiplication and strictly follow the specifications decided upon. Even now minimum specifications exist for purity based on percentage mixture of other varieties, and on viability based on germination tests in trays or boxes, but the specifications do not refer to any other factors. Even with regard to purity, it is not easy to determine by the mere appearance of the grains, unless there the size, shape and colour of the grain show marked variation. The only way of determining genetical purity and identity is to grow samples of seed in the field and compare



the performances of the plants. Viability can be easily determined even without special equipment, but it is necessary that at least in the first two stages of production, which are under the control of technical personnel, the determination of purity and viability is made in a scientific manner so that the seed produced conform to the ideal standards expected.

Seed testing is also a science and has yet to develop in this country. There is therefore need to establish seed testing stations with specially trained personnel where all the different factors connected with production of good seed will receive attention. In this connection, the Agricultural Production Team sponsored by the Ford Foundation, in its report on "India's Food Crisis and Steps to Meet it, 1959" has dealt with this matter elaborately and has made several recommendations (Chapter X, Pp. 194-209). The time is now appropriate that a beginning is made in some States as Madras, where seed work has made tangible progress, to give effect to these recommendations.

The action that might be usefully taken, will be the establishment of a seed testing station and organisation of a cadre of seed specialists in the State. Each district can have a special officer looking after seed work. When once this organisation is set up, its influence can be effectively extended to seed farm growers.

The Team, therefore, recommends the proposals for the establishment of central testing station along with regional laboratories, which have been submitted by the Madras Government for the Third Five Year Plan.

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## CHAPTER VI

### STATE SEED FARMS

#### (Types of Seed Schemes)

- (1) *Comparative economics of various types of schemes with a view to better programming and planning for the future*

Before the introduction of State Seed Farms, the method was to give departmental seed to selected ryots called Seed Farm Ryots (Registered Growers) who entered into an agreement with the Government to maintain purity of crop by roguing, and to supply to the department specific quantity of seed, if required, at a premium of 12½ per cent for ordinary paddy and millets and 15 per cent for an early crop of paddy grown in July. Seed procured from these primary seed farms was again given for multiplication to other seed farm ryots called secondary seed farm ryots, and the produce was procured by the Agricultural Department and stocked in depots one for each Extension Officer or Demonstrator stationed in each taluk (or Tahsil) for sale to ryots.

The introduction of State Seed Farms where the Agricultural Department multiplies improved seed under the management of its own staff is only of recent origin, beginning with 1956-57, the first year of the Second Five Year Plan and was started at the instance of the Government of India. Under this scheme, the Union Government give financial assistance to the State Government to meet (1) the cost of land at Rs. 1,500 per acre, by a 75 per cent subsidy and 25 per cent loan, (2) cost of irrigation charges at Rs. 10,000 per farm (25 acres unit) on loan, and (3) cost of seed stores at Rs. 10,000 per store at 75 per cent subsidy and 25 per cent loan. The working expenses and pay of staff were to be met by the states. Due to difficulties of acquiring land, the States were also allowed to establish farms on leased land. The object was to have a large supply of departmentally multiplied seed to serve as a foundation stock for multiplication later by ryots, so that the whole area under the crop could be saturated with good seeds once in three or four years and the cycle repeated every year. Incidentally the necessity to pay premium to growers which existed formerly at the primary stage was abolished considerably reducing the total expense by about a crore of rupees for procurement annually.

With the coming of the State Seed Farms the primary stage is being gradually abolished and the State Seed Farms are producing most of the requirement of improved foundation seed of paddy and gradually also of millets in Madras.

*Quantities of seed distributed at the primary stage (tons) in Madras*

	1956-57	1957-58	1958-59	1959-60
<b>PADDY</b>				
From State Seed Farms . . .	290	1,280	1,727	1,715
From Primary Seed Farm ryots . .	412	61	112	517
<b>TOTAL</b> .	<b>702</b>	<b>1,341</b>	<b>1,839</b>	<b>2,232</b>
<b>MILLETS</b>				
From State Seed Farms . . .	12	27	75	77
From Primary Seed Farm ryots . .	19	160	89	153
<b>TOTAL</b> .	<b>31</b>	<b>187</b>	<b>164</b>	<b>230</b>

In order to improve distribution at the Secondary Seed Farm stage the Government of Madras introduced a new system called "Village Seed Farms" in 1956. Under this system the quantity of seed required to cover the whole area of each village once in four years was determined and distributed to selected Seed Farm Ryots. Registered Seeds were distributed to other ryots either for cash or on exchange basis. Germination and purity tests are required to be conducted on the Village Seed Farm stocks but standards had been drawn up only recently for the same. Hence the purity and germination tests were not being adhered to strictly. This Village Seed Farm method has got the advantage of making each village self sufficient and also saves the labour and trouble involved in procurement, storage and maintaining accounts. The success of this system, however, needs further examination. The Agricultural Demonstrators and Extension Officers who were often made to face charges and explanation for shortage of stocks or defects in maintenance of accounts find this system easier to work. Besides the necessity to pay premium on seed is avoided as procurement is either not done or is restricted to a minimum.

The State Seed Farms have come to stay and there is no other system to compare with it for the foundation stage.

*(2) Working of State Seed Farms in Madras*

(a) *Number and size of seed farms.*—On April of 1960 there were 59 State Seed Farms in Madras of which 28 were on leased lands, 14 on Government lands and 17 on acquired lands, making up a total of 130 units of 25 acres.

The progress in the establishment of these farms, was as below, against a target of 211 farms by the end of the Second Five Year Plan :—

**PROGRESS OF SEED FARMS**  
*Second Five Year Plan (in terms of 25 acres unit).*

Year	Progressive total (Units)
1956-57 . . . . .	15
1957-58 . . . . .	83
1958-59 . . . . .	94
1959-60 . . . . .	130
1960-61 . . . . .	(Target 211)

The frequency of the sizes of the seed farms as on 1-4-1960 was as below :—

**SIZE OF STATE SEED FARMS**

Range of size (acres)	Frequency (number)
21—30 . . . . .	8
31—40 . . . . .	6
41—50 . . . . .	27
51—60 . . . . .	9
61 & above . . . . .	9
TOTAL . . . . .	59

Nearly half the farms are now between 41 to 50 acres.

(b) *Cost of production in small and large farms.*—Data of cost of production of paddy per ton are available for 45 State Seed Farms during 1958-59. Arranged according to size, the cost of production per ton of paddy was as follows :—

*Cost of production per ton of paddy (Cultivation charges only) (Rs.)*

Size range of farms (acres)	No. of farms	Average cultivation charges per ton (Rs.)
21—30 . . . . .	8	200.9
31—40 . . . . .	8	258.6
41—50 . . . . .	18	217.5
51 & above . . . . .	12	192.2
TOTAL . . . . .	46	

No definite relationship seems to emerge between the size of farm and the cultivation charges per ton of paddy.

(c) *Establishment Charges.*—The establishment charges per acre however decreased with the increase in size of farms as below :—

*Establishment charges per Acre of State Seed Farm according to size*

Size range of farm. (acres),	Establishment charges per acre (Rs.)
21—30 . . . . .	115.6
31—40 . . . . .	107.3
41—50 . . . . .	99.0
51 and above . . . . .	67.5

Larger farms therefore reduce costs of working per acre by their lower establishment charges per unit.

(d) *Income and expenditure of State Seed Farms.*—In Appendix XIII are given the income and expenditure of all the 59 State Seed Farms for the year 1959-60. The profit and loss have been worked out for each farm by taking into account the recurring charges of lease, establishment and cultivation, and also the value of balance of stocks of seed over the previous year's balance. Capital charges were not taken into account. Of the 17 acquired farms 15 worked on a profit. Of the 28 leased farms only 6 gave profits, and of the 14 farms on Government land 10 worked on a profit. As the income and expenditure ranged considerably and the profits from Rs. 42,000 to 25,000 per farm, the data are presented in a frequency form to show the ranges of profits and losses:

*Distribution of profit and loss per Acre among State Seed Farms taking into consideration recurring charges only.*  
Frequency (number)

Profit range (loss—) Rs.	Leased lands	Acquired lands	Govern- ment lands	Total
Over — 25,000 to —20,000 . . .	1	..	..	1
Over — 20,000 to —15,000 . . .	3	..	..	3
Over — 15,000 to —10,000 . . .	6	..	..	6
Over — 10,000 to —5,000 . . .	7	1	2	10
Over — 5,000 to 0 . . .	5	1	3	9
Above 0 to 5,000 . . .	2	3	2	7
Above 5,000 to 10,000 . . .	1	5	2	8
Above 10,000 to 15,000 . . .	1	5	..	6
Above 15,000 to 20,000 . . .	..	1	..	1
Above 20,000 to 25,000 . . .	1	1	..	2
Above 25,000 to 30,000 . . .	..	..	2	2
TOTAL .	27	17	11	55
NOT WORKING .	1	..	3	4
GRAND TOTAL .	28	17	14	59

It will be seen from the above table that the leased lands are working at a loss generally. The acquired lands worked on a profit in most cases and the Government lands to a lesser extent.

The average profit per acre among leased, Government and acquired lands were as follows :—

*Average income, expenditure and profit per Acre (Rs.) with recurring charges of State Seed Farms (Madras 1959-60)*

Recurring expenditure	Leased lands	Acquired lands	Government lands	Total All lands
1. Leased . . . . .	183.9	..	..	92.0
2. Establishment . . . . .	86.0	89.3	42.2	77.3
3. Cultivation charges . . . . .	319.5	300.7	360.9	313.8
Total recurring expenditure . . . . .	589.4	390.0	403.1	483.1
Cultivation charges only . . . . .	446.6	868.8	126.5	193.4
Profit or loss over Cultivation and establishment & lease . . . . .	123.9	173.0	122.3	14.1

It was found that all farms had given more than cultivation expenses, whether on leased, government or acquired lands. When, however, the establishment and lease are also taken into account, the leased lands alone are unprofitable. Taking the average value of lands at Rs. 1,800 per acre, the acquired lands have given a profit of 9.5% on capital, while farms on government lands have given 6.8% during 1959-60.

It can also be noted that all farms together have given an income per acre which is just a little over the costs of cultivation, lease and establishment charges.

(c) *Yield per Acre in State Seed Farms and targets.*—For planning of seed production and distribution, the average yield per acre of paddy was taken by the Agriculture Department as one ton. The yield per

acre of paddy actually attained in the 47 State Seed farms were as follows :—

*Frequency of Yield Per Acre of Paddy (tons) in State Seed Farms 1958-59 (Madras)*

Class range (tons)	"	Number of farms
·46 to ·55	. . . . .	3
·56 to ·65	. . . . .	1
·66 to ·75	. . . . .	4
·76 to ·85	. . . . .	8
·86 to ·95	. . . . .	14
·96 to 1·05	. . . . .	7
1·06 to 1·15	. . . . .	4
1·16 to 1·25	. . . . .	2
1·26 to 1·35	. . . . .	3
1·36 to 1·45	. . . . .	..
1·46 to 1·55	. . . . .	..
1·56 to 1·65	. . . . .	1
TOTAL		47

State Target.

Average  
0·92 ton

About 92 per cent of the target of yield per acre of paddy was attained during 1958-59.

In the case of millets, the original target was fixed on the basis of average yield. The yields per acre in State Seed Farms with the corresponding district average for cholam and ragi were as follows:—

*Yield per Acre (lb.) in State Seed Farms compared to the district average*

CHOLAM				RAGI			
District	In State Seed Farms	District Average		District	In State Seed Farms	District Average	
Coimbatore . . . . .	1,170	650		Coimbatore . . . . .	1,270	1,000	
Ramanathapuram . . . . .	900	750		Chingleput . . . . .	865	770	
Salem . . . . .	555	800		S. Arcot . . . . .	1,053	981	
Tiruchirapalli . . . . .	611	700		N. Arcot . . . . .	490	1,084	
Madurai . . . . .	513	725		Tiruchirapalli . . . . .	728	750	
Weighted average . . . . .	681	690		Weighted average . . . . .	916	887	

Although there are variations in the districts, the state average yield per acre is more or less kept up in the State seed farms during 1959-60.

In groundnut, the yield per acre on the basis of which the programme was undertaken was 750 lb. per acre of pods. The average yields per acre of State Seed Farms in different districts during 1959-60 were as follows :—

*Average yield per Acre (lb.) of Groundnut of different Districts*

Name of District	Average State Farm yield per acre
Chingleput . . . . .	1,101
Tiruchirapalli . . . . .	634
S. Arcot . . . . .	720
Coimbatore . . . . .	722
Salem . . . . .	370
Madurai . . . . .	271
Weighted average . . . . .	543

The average yield per acre of groundnut in State seed farms was about 72 per cent only of target during 1959-60.

(f) *Yield per acre according to size of farms.*—From the data of 46 farms, the average yield per acre of paddy was as follows :—

Size of Farm (acres)	Average yield per acre (ton)
21-30 . . . . .	0.88
31-40 . . . . .	0.86
41-50 . . . . .	0.97
51-60 . . . . .	0.91

The differences are small and not statistically significant. There does not appear to be any defined relationship between yield per acre and the size of State Seed Farms.



(g) *Cropping pattern of seed Farms ; Madras 1959-60.*—

	Area (acres)	Production Tons	In State Seed Farm	Percentage to the total area in the State
Paddy . . . . .	2,014	1,989	60.0	33.5
Jowar . . . . .	107	32	3.1	10.3
Ragi (Nagli) . . . . .	150	53	4.4	5.1
Cumbu (Bajra) . . . . .	52	10	1.5	7.2
Other Millets . . . . .	276	10	8.0	6.7
Groundnut . . . . .	284	84	11.2	11.5
Gingelly . . . . .	31	1	0.9	1.7
Castor . . . . .	42	1	1.2	0.1
Cotton . . . . .	156	26	4.5	6.1
Potato . . . . .	172	711	5.0	0.01
Blackgram . . . . .	50	1	1.5	0.06
Redgram . . . . .	..	..	..	0.06

Compared to the State pattern, the proportion of area under paddy is more in State Seed Farm, and less of cholam and cumbu.

(h) *Supervision and Coordination.*—In Madras there are two distinctive factors in State Seed Farms, namely the appointment of a Joint Director of Agriculture exclusively for seed farm work, and the appointment of Advisory Committees for each State Farm with the Revenue officers as chairman and other members. The Team, however, considers it desirable that selected persons from the Block Committees should be associated with the Advisory Committee for each State Seed Farm as members, and in the case of bigger farms, the advisory committee should consist of representatives of Block Samities.

### (3) *Case studies of State Seed Farms*

The case studies of the following seed farms namely Sekkottai, Marudanellur, Devadanam, Vellappakkam, Kolandalur and Pongalur are given in Appendix IX. From the data available, a rough estimate of working costs of these State farms in respect of lease, establishment and capital investments can be obtained.

*Case studies of the working of State Seed Farms in Madras State*

Average Cost Acre

	Leased lands (97 acres)	Acquired lands (172 acres)
Lease amount . . . . .	157.40	..
Establishment . . . . .	64.70	81.00
Other working expenses . . . . .	354.40	308.80
TOTAL COSTS . . . . .	576.50	389.80
Income . . . . .	526.00	502.00
Profit(+) or loss (—) over running expenses . . . . .	—50.50	112.20
Deduct 5% interest on capital value of land . . . . .	..	119.10
Net loss(—) or profit(+) per acre after meeting interest	—50.50	—6.90

These acquired farms have given an average profit of Rs. 112 over the costs of cultivation and running expenses per acre. They have very nearly met the interest on capital in the third year of working, the loss being only Rs. 6.90 per acre.

In the case of leased lands, the loss is rupees 50.50 per acre. Although only a small number of farms was studied the data indicate generally that it is more advantageous to acquire lands for the State Seed Farms, than take them on lease as shown by the fuller data prescribed in section (2).

Based on the above, the Team recommends the following improvements :—

(i) The practice of leasing lands for establishing seed farms should be stopped as it adds to working cost and also hampers permanent improvements.

(ii) The size of the new farms may be increased to 50 acres or more as this will reduce establishment and supervision costs per acre and give more scope for multiplying crops like pulses, groundnut and millets where production is not adequate so that all new farms may be 50 acres or more in size.

(iii) Unassigned Government lands may be got transferred as far as possible, as this will reduce capital investment of Seed farms and also effect land reclamation.

(iv) Large blocks of 100 acres and more each may be acquired in the vicinity of Agricultural Stations, especially for groundnut, millets, pulses and potatoes, where the tempo of foundation seed production has to be increased. These may be placed under the charge of the staff at the Research Stations.

(v) To run a farm on economic lines, men with experience are required. Out of 47 Farm Managers on 30-6-1960, 5 were fieldmen promotees, 22 were agricultural graduates with less than 2 years experience, 10 with 2 to 5 years experience and 10 with 5 to 10 years experience. Therefore, more experienced staff can be posted to these State Seed Farms although this presents problems. It is also necessary that the employed staff should be trained for the work in the breeding stations for seed work.

(vi) The State Seed Farms must produce more millets, groundnut and pulses from improved strains.

(vii) Only 34 farms will have seed stores by 1960-61, the balance should be completed early.

(4) *Comparison of State Seed Farms with special seed multiplication for Cotton*

The Indian Central Cotton Committee and the Madras Government are jointly financing special schemes for the multiplication of seeds of improved strains of cotton K2, K5, MCU1 and MCU2. Similar schemes also exist in other States. Under this scheme, breeder's seeds of the strains are multiplied under the direct supervision of an Assistant Cotton Specialist and his staff, over the area required, under seed farms agreement in four stages through registered growers called A, B, C, D for rainfed cotton and in three stages for irrigated cottons. The multiplying rate ranges approximately from 1:10 for irrigated cotton, and 1:5 for rainfed types. Complete roguing is done in the earlier stages and a rough and rapid roguing at the last stage. The ryots are induced to pool the produce in a common ginnery run on a cooperative basis or to hand over to selected merchants who undertake to purchase the kapas, clean and gin it and return pure seeds to the department, under its supervision. Seeds possessing the required purity and germination alone are produced, bagged and sealed and the cycle repeated in the different stages to cover the required area as follows :—

Name of strain	Area of seed farms	Area of crop to be covered
	Ac.	Ac.
Deshi K2 . . . . .	30,000	450,000 rainfed
Deshi K 5 . . . . .	20,000	1,47,000
American MCU1 . . . . .	6,000	90,000
American MCU 2 . . . . .	6,000	74,000

In this special scheme run with staff partly financed by the Indian Central Cotton Committee, there are two Agricultural Demonstrators, two fieldmen and four demonstration maistries for every 5000 acres of rainfed or 2000 acres of irrigated seed farm under the Assistant Cotton Specialist. In the Village Seed Farm scheme, there is only one Demonstrator for every taluk or Agricultural Extension Officer for every block with one fieldman and two maistries, or a Gramsevak for every 5 to 10 villages. The success of the scheme is also due to the high price paid for the cotton of the pure improved strain. Further when the grant from the Indian Central Cotton Committee ceases, after a period of years, the cycle of multiplication will have to be done through the State Agricultural Department and foundation seed raised in State Seed Farms.

*(5) Comparison of different systems for distribution of registered seed*

In Madras, the improved seed of Registered Growers is sold for cash or exchanged with seed from other growers. Procurement is not done. This does away with the need for premium. Even the inducement of 25 naye paise for services and 12 naye paise for sealing per bag of 160 lb. is not availed of by the Registered Growers. The view is, however, expressed that in this system of Village Seed Farms there is scope for exaggeration of quantities distributed. Some opinions favour the procurement of seed from A Class growers whether by the Department or cooperative societies for effective distribution. The quantity to be distributed annually is of the order of 24,000 tons for paddy and 5,000 tons of millets. As the whole area of the State is to be covered by the blocks, procurement by the Agriculture Department is ruled out, so also by the block staff as they are not provided with funds for the purpose.

*(6) Role of Village Panchayats in Seed Distribution*

The Panchayats in the villages can however play a useful part in seed distribution. It should be made a function of each Panchayat to see that at least one grower in the village gets improved seed as a Registered Grower or from a State Farm, at least enough to seed an acre. The Village Panchayat need not handle large stocks. Their function will be to see that the village gets improved seed of important crops, and if necessary, to arrange to get it from the district staff. By this method each village can be covered. We have therefore to look to the existing Village Farm system which has worked satisfactorily so far, and to devise ways and means to intensify the same so that the full saturation may be reached.

(7) *Village Seed Farms and Registered Growers*

The quantity of seeds distributed through village seed farms during 1958-59, for cash or by exchange in Madras is reported to be as follows :—

*Distribution of Village Seed Farm Seeds (tons)*

Paddy	Millets
16,248	1426 by the Agriculture Department.
9,890	1026 by the block areas.

or a total of roughly 26,000 tons of paddy and 2,450 tons of millets against a sufficiency programme of 24,000 tons of paddy and 5,500 tons of millets.

In the four years 1956-57 to 1959-60, the quantity of paddy distributed was roughly 64,530 tons or about 65 per cent of the 96,000 tons required to saturate the area in four years. There is therefore need to intensify the Village Seed Farm work for paddy. In millets the quantity reported as distributed was only 40 per cent of the target needs, and here also more intense coverage is necessary.

In order to meet the above objective, the Team recommends that :

(1) The villages where improved strains have spread should be marked out from the Village Seed Farm records. A programme of distribution of improved seed to villages, not covered should be intensified and wherever possible individual ryots be induced to grow the improved seed.

(2) This village to village programme should be pursued through village panchayats to realise the original purpose of covering every village with improved seeds incidentally doing away with the need for procurement, payment of premia and handling of stocks and maintenance of accounts by the Departmental staff.

(8) *State Trading*

Under the Village Seed Farm system, or where the Gramsahayaks distribute improved seed to other ryots in the village, there will be no need for procurement and therefore for State Trading. But where due to the low rate of multiplication, as in groundnut or cotton, procurement in two or more registered stages is necessary, there will be need for State Trading. In such cases there will be handling of stocks by Departmental staff and the problem of unsold stocks. But where such unsold stocks occur, their disposal should be rendered quick under technical advice. This will help the tempo of work, even when State Trading is necessitated by two or more stages of Registered Seed.

## CHAPTER VII

### PRIORITIES OF THE PROGRAMME AND ITS PHASING FROM TIME TO TIME

#### (1) *Priorities*

(1) *Priorities*.—As already stated the first priority should be given to the spread of improved strains of rainfed millets, groundnut and pulses, which are also the crops of the poorer cultivators.

(2) The second priority should be given to coverage of the balance of area, to be covered by improved strains in paddy (37 per cent), sorghum (50 per cent), cumbu (47 per cent), cotton (38 per cent), ragi (32 per cent), and gingelly (28 per cent).

(3) A reduction in the number of strains of paddy by intensifying breeding and also more research on rainfed varieties of groundnut may be taken up.

(4) A programme to cover at least 75 per cent of the area in minor millets and pulses by the end of the Third Five Year Plan, should be phased, by production of enough foundation seed through State Seed Farms and multiplying through Registered Growers in as many villages as possible.

(5) In groundnut, where the multiplication factor is low, nucleus seed farms of 100 acres or more each, in good productive areas, adjacent to the existing research stations should be acquired under the State Seed Farm allotments, so that the existing supply of foundation seed can be increased at least five fold (*i.e.* from 200 to 1,000 acres), and one more stage (B) introduced to make available seed from 5,000 acres every year to cover 25,000 acres.

(6) In the case of cumbu (bajra) which offers special technical problems in utilising hybrid vigour, the extent of land allotted to specialists should be increased through State Farms adjacent to the breeding stations in order to increase the present supplies of hybrid cumbu from 25 tons to at least 100 tons and special additional staff provided for the purpose.

(7) Adequate facilities for threshing floors and storage godowns should be provided by the Third Five Year Plan as progress in this direction is slow, and also equipment for cleaning, winnowing and testing of seeds.

(8) Increase in the area of farming, increase in the production of foundation seed and primary seed for the crops mentioned in previous pages and increase in proper storage facilities may be taken up.

(2) *Phasing of the quality programme*

(a) *Seed Specialists*.—As expert knowledge in seed is now not yet developed a beginning can be made with the sanction of the seed testing schemes for each state. It should however be necessary to co-ordinate their work with that of the Crop Specialists as well as the district staff so that full utilisation is made of the findings of research up to the foundation stage in the Department and the registered stage with the ryots. The Seed Testing Officer should act as a supplement to the Agricultural Officer by check analysis of samples at the registered stage and by pooling of information regarding dormancy, viability, deterioration and methods of storage of improved seeds of different varieties of crops.

(b) *Seed Treatment and Storage*.—Seed is stored in gunny bags of 160 lb. net or in straw twists and it is the practice in Madras to treat the seed against seed borne diseases with organo-mercuric compounds like Agrosan (or Corasan) at sowing time. In Bombay surplus paddy seeds from research farms are pretreated in salt solution and fungicides, packed in cloth bags of 20 lb. to cover one acre and packing is done on orders. Cholan seeds are pretreated with sulphur, wrapped in cellophane paper first and packed in cloth bags to contain 5 lb. seed for one acre. This practice is recommended in Madras and other states for special cases.

It is also necessary that seed should be well cleaned and dried before storage. Mechanical winnowers should be used in the Farms and Research Stations for cleaning without having to depend on natural wind. Agricultural implements and plant protection equipment should also be provided.

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## CHAPTER VIII

### ADMINISTRATION AND COORDINATION

#### (1) *Departmental Set Up.* (Cf. Appendix X)

The set up of the Agricultural Department in Madras follows the general pattern in other States with the Director of Agriculture at Madras as the head assisted by a Dean or Additional Director at the Agricultural College and Post-Graduate Institute at Coimbatore in control of research. Joint Directors at headquarters are in charge one for extension, one for State Seed Farms, one for planning and development and a fourth for inspection. For each group of districts there are regional Deputy Directors four in number. Under them are two District Agricultural Officers for each revenue district except Kanyakumari and Nilgiris. Under each Deputy Director there is a Seed Development Officer whose function is to maintain the quality and multiply the quantity of improved seed. His duties are to collect nucleus seed in advance for sowings, inspect and check independently the purity and germination tests performed on the State Farm and Village Seed Farm seeds, personally inspect roguing in the State Seed Farms, arrange for distribution of the proper varieties to each Demonstrator and arrange for drying and protection against insects of stocks of improved seeds in depots. Under each District Agricultural Officer there is one Agricultural Demonstrator for two or three firkas and in his block area one Agricultural Extension Officer working under the administrative control of the Block Development Officer and the technical control of the District Agricultural Officer. Gramsevakhs, one for five to ten villages, work under each Agricultural Extension Officer while under each Demonstrator is posted a unit of two fieldman and four maistries.

On the research side there are Crop Specialists working under the Dean in the Research Institutes for paddy, cotton, millets and pulses, sugarcane, oilseeds and horticulture and a Professor of Botany. Evolution of improved strains is the responsibility of the Specialists for each crop at Coimbatore, generally assisted by Assistant Specialists or Superintendents working in 22 Research Stations distributed in the districts of the State catering to the locally important crops. The State Seed Farms are under the control of the District Agricultural Officers concerned. For each State Seed Farm there is a Farm Manager assisted by a fieldman and maistry, and in larger farms by a clerk also.

#### (2) *District trials.*

Enquiries with the research and district staff in the State reveal that these trials are not always satisfactory and some have to be rejected. The Agricultural Demonstrator or Extension Officer does this work



along with a number of other duties as crop cutting experiments, distribution of seed, implements and manures and depot work. Without his cooperation no district trial can be conducted. There is however a case for improving the efficiency of the trials by giving additional help to the district staff for conducting this work especially for layout and harvest. Further, as has been pointed in the Chapter on Research Section (3) a statewide trial of all existing varieties and some outstanding outside ones is necessary to utilise their full potentialities under different conditions. It is therefore recommended that each District Agricultural Officer may be given one Technical Assistant trained in the Agricultural Research Stations for conducting the district trials. Besides, he can also analyse samples of seed at the registered stage and conduct germination tests at regular intervals.

### *(3) Special officers for seed work*

Formerly there were two Seed Development Officers for paddy and one for millets in the Madras State with an assistant for each under the control of the Joint Director (Inspection). Now these officers are placed under the Deputy Directors one for each region for foodgrains while one Oilseed Development Officer of the grade of Deputy Director helps in the development work as well as seed distribution programme. Similarly a Cotton Extension Officer helps in the general extension programme as well as the seed programme attached to the scheme besides the Assistant Cotton Specialist and staff allotted to the specific seed multiplication schemes for each strain. These Officers form a coordinating link between the Specialist and district staff. They arrange the planning of nucleus seed for each district, conduct purity and germination tests and also help in the progress of State Seed Farms by frequent visits and suggestions for improvements. This work should be amplified by provision of more assistant staff. Some of these Seed Development Officers are recruited from Research Sections and some from the district staff. It is however necessary that the seed programme should be under competent technical personnel. It is therefore suggested that while the extension officer may be recruited from the district cadre, the Seed Development Officer can be recruited from staff trained by the Specialists in the Research Stations.

There were 148 blocks with one Agricultural Extension Officer for each Block in 1958-59 and 210 Agricultural Demonstrators. Each Demonstrator is provided with two fieldmen and four maistries, and each Agricultural Extension Officer with two fieldmen and two to four maistries and a Gramsevak for five to ten villages.

Considering the large number of Gramsevaks employed the output of seed work per capita is relatively low in the block areas for the field hands. Although Gramsevaks have other functions to perform the agricultural output of work per capita should receive more attention.

#### (4) *Gramsahayaks*

In this connection, the Madras Government have proposed this year to entrust the work relating to seed multiplication to what are known as "Gramsahayaks" or village leaders on a part remuneration basis in the developmental blocks. According to this scheme, these Gramsahayaks will serve as a popular and necessary intermediary between the Gramsevak and the cultivator. Village leaders camps are being organised and the Gramsahayaks are trained in improved farming practices. There are now ten Gramsevak in a block and it is proposed to have one "Gramsahayak" for each village. The functions of the Gramsahayak will be to practise and demonstrate all aspects of better farming and to multiply improved seed for supply to other cultivators, under the directions of the Panchayat, for which he will be paid a premium of rupees two per maund. He will not be a paid employee of the Panchayat or of the Government.

The Team recommends the above scheme for implementation as it can effectively meet the object of distribution of seed to every village.

#### (5) *Supervision and direction*

For Grow More Food schemes, the practice exists in Madras of verification of the achievement of work by reports from the revenue staff and a review of this is attached to the Administration Report of the Agricultural Department. In the case of spread of improved varieties this work requires more technical appraisal. It is also necessary that crop specialists should tour more in the villages to get first hand knowledge of the ryots' needs.

The coordination of research and extension, at the highest departmental level, is in the hands of the Director of Agriculture. The Director's task should be based on a sense of real values and understanding of the technical programme based on the requirements of the cultivator, so that exercise of authority follows technical competency. This should be ensured by posting scientific men of merit and distinction as Head of the Agricultural Department.

#### (6) *Co-ordination of work with the Farmer (Publicity)*

The Madras Government ordered in G. O. 1948, Food and Agriculture, 4-6-1960 the celebration of 'SEED DAY', and the first day was celebrated on the auspicious 2nd August 1960, and is to be observed every year. The celebration was held at all levels at district headquarters, taluk headquarters, block headquarters and in selected villages.

The problem of contacting ryots, who do not grow improved seed or are not acquainted with it still remains. Some progress has been made through village associations, one for each village, in Madras, where meetings are held periodically and the ryots made to understand

the value of agricultural improvements and improved seed and are also made to place indents for the latter. Such bodies as the Farmer's Forum also exist for such work. In spite of the 40 years of breeding work in paddy in Madras there are still ryots who say they do not know the value of improved seed and some others who are unable to get it. The remedy, therefore, seems to lie in intensifying seed work in every village as mentioned above.

## SUMMARY OF RECOMMENDATIONS

### *I. Recommendations*

(1) The phasing of the improved seed programme may be carried out with the following priorities in the order of importance:—[Ch. VII-(1).]

(i) Coverage of 75 per cent of the area in pulses and minor millets by the end of the Third Plan Period.

(ii) Mapping out fresh areas for distribution of seed of already popular strains of paddy, cotton, sorghum, etc., through an intense planned coverage of new villages and new ryots to saturate the entire area by the second plan period.

(iii) Village Panchayats shall be made responsible to see that improved seed of major crops reaches each village and if not, to arrange for its supply from the district staff.

(2) In the case of State Seed Farms:—[Ch. VI (3).]

(i) The future size and the existing size wherever suitable may be increased to 50 acres for each farm as this will reduce working costs per acre and help to overcome the existing shortage of foundation seeds of pulses, groundnut and millets.

(ii) The practice of leasing lands for the purpose of establishing Seed Farms may be stopped as it adds to working costs and hampers permanent improvement.

(iii) Unassigned Government lands may be got as far as possible as this will reduce capital costs and also provide for reclamation and expansion as desired.

(iv) Large farms of about 100 acres each amounting to about 1,000 acres in all may be acquired near or in the vicinity of agricultural stations in rainfed areas especially for growing groundnut, millets and pulses, where the tempo of foundation seed production has to be increased and they may be kept under the control of the Research Stations concerned.

(v) Selected members of the Block Committees should be associated with State Seed Farms as members of the ADVISORY COMMITTEES.

(3) A periodical survey of the spread of improved varieties for all crops is necessary as was done in paddy and millets. It is suggested that a sample survey of one village for every 3,000 acres of cropped area will give adequate information practically for all crops. [Ch. IV (2).]

(4) The Madras scheme for the establishment of regional seed testing stations and laboratories with provisions for field testing submitted for the Third Plan may be approved as also similar schemes from other States also, as this will help considerably to improve the quality of seeds distributed. These schemes may be coordinated with similar schemes in the centre. The practice in Madras of using tetrozolum bromide for quick germination tests in paddy and cotton may be extended to other States.

(5) The system of State Seed Farms which has succeeded in nearly meeting the targets for paddy may be expanded to meet the full needs of other crops by the end of the Third Plan period. [Ch. VII.]

(6) More facilities like proper seed store, threshing and drying floors have to be provided, and special equipment for cleaning grain and receptacles also supplied. [Ch. V(6).]

(7) The Village Seed Farm system which has proved successful for covering large areas under paddy is considered best for future saturation of the whole area with major crops by the Second Five Year Plan period and for the minor crops in the Third Plan Period. It should be extended to cover every village with improved seed. In this connection, the Team recommends the implementation of the proposal under consideration of the Madras Government to have Gramsahayaks for every village to act as Village Leaders, Model small farm cultivators and secondary producers of improved seed. [Ch. VIII(4).]

(8) For proper field trials and also expanding the scope of testing seeds at all stages, one specially trained Assistant may be posted for work with each District Agricultural Officer. [Ch. VIII(2).]

(9) The work of Seed Development Officers in testing seed and helping State Seed Farm work should be amplified by provision of more assistant staff if necessary, so that all registered seed can be fully tested before distribution. [Ch. VIII(3).]

(10) The Seed Testing and Development Officers may be recruited from the Crop Specialist staff and the Extension Officers from the district staff. [Ch. VIII(3).]

(11) Technical direction at the highest level of the Agricultural Department is recommended to meet the needs of seed distribution and other associated activities. [Ch. VIII(5).]

(12) More contact between the Specialists and the ryots is desirable to correlate the basic seed problems of the latter with the fundamental research programmes of the former. Special facilities should be provided for Specialists to undertake frequent tours in the villages. [Ch. VIII(5).]

(13) State trading in seed has been considerably reduced by the system of State Seed Farms, supplemented by the Village Seed Farm system of distribution of improved seeds to ryots. Restricting State trading to a minimum can improve the efficiency of seed work. Arrangements must be made to dispose of unsold stocks of one year rapidly under clear technical administrative advice, so that disciplinary proceedings against subordinates can be avoided or reduced to a minimum. [Ch. VI(8).]

(14) In Maharashtra, after the supply to State Seed Farms has been completed, the practice exists of sending out on orders pretreated seed from agricultural stations packed in cloth bags in small quantities to ryots. This practice is recommended for adoption in Madras particularly to ryots in new areas, so that the supply can be used only as seed, and without affecting the general programme of large scale distribution. [Ch. VII(2b).]

(15) Large scale distribution can be effected only if every village gets improved seed. This aspect should be emphasised at every stage of multiplication and distribution, and all steps directed to that end. Foundation for seed work should be laid in the villages. For this purpose more ryots in the villages need to be educated to appreciate the value of good seed by actual demonstration trials, in the villages, particularly those not covered by improved strains. Village Panchayats and Gramsevakas should be made to help in this work. The aim in seed distribution should be to saturate whole villages with improved seed as rapidly as possible. Along with such saturation, there must be a regular and continuous flow of pure seed into the village so that each ryot can renew his seed once in three to five years depending on the crop he grows. [Ch. VIII(6).]

## *II. Statement of extra staff recommended and financial requirements*

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	Per year Rs.
22 Technical Assistants at one for each district . . .	66,000

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## *III. Action taken or proposed to be taken by the Madras Government on the recommendations of the Team*

The recommendations of the Seed Multiplication Team 1(i), 1(ii), 1(iii), 2(i), 2(ii), 2(iii), 2(iv), 3, 5, 6, 7, 8, 12, 14, 15 and 17 have

either been accepted by the Madras Government or are being implemented. Recommendation (4) refers to the establishment of Seed Testing Station, which was not formerly approved by the Government on financial considerations. The Madras Government have kindly considered the matter and agreed to reconsider the same.

With effect from 1st April 1961, the Government of Madras have sanctioned a scheme entrusting the work of multiplication and distribution of improved seeds to the Panchayats Organization, with Gramshayaks in every village to act as Producers and Distributors of the improved seed in line with recommendation (9) of the report. The Madras Government have also proposed to intensify the Agricultural work in the State by having one District Agricultural Officer to a Revenue Division and increasing their number.

The recommendations 8, 9 & 11 made by the Team in respect of staff are being considered by the Madras Government in the light of the above reorganisation, by merging the posts of Seed Development Officers with those of District Agricultural Officers and having a Seed Development Assistant for each District Agricultural Officer for improved seed work.





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# Improved Strains in Madras (1959-60)

	(A) Paddy				
75	July	...	Tanj		
95	June		January	Three	Arce
220	July				Tanj



1	2	3	4	5	6	7	8	9	10
8	Adt 20	. . .	Sirumari X 1940 Kuruvair Cross	105	July	August	Tiruchirappalli, S. Arcot.	4000	Short round; White.
9	Adt 22	. . .	Vadana Samba 1941	155	June	July	Chinglepet, Arcot.	3000	Medium Brown, Semidry.
10	Adt 25	. . .	CO 4 x Adt 2 1953	165	October	..	Tanjore.	2500	Blas resistant, Fine rice.
11	Adt 1	. . .	Kar Samba Red 1944	115	June	January	Tirunelveli	4000	Coarse Medium red.
12	Adt 3	. . .	Vedivadangan 1944	130	June	..	Ditto.	3200	Coarse red.
13	Adt 4	. . .	Kuruvai Kala- yan 1945	135	July	..	Ditto.	2400	Ditto.
14	Adt 5	. . .	Karthigai Samba 1945	135	October	July	Ramanathapuram, Tirunelveli, Ma- durai Districts.	3250	Fine White; Late Planting.
15	Adt 6	. . .	Anaikomban . 1945	170	July	..	Tirunelveli, Ramna- thapuram.	3800	Medium White; Non- shedding.
16	Adt 7	. . .	Kar Samba Red 1945	110	June	..	Tirunelveli	4000	Coarse Red, Non- shedding.
17	Adt 8	. . .	Thuyamalli . 1952	85	January	..	Madurai, Tirunelveli	3000	Fine white; short duration.
18	Adt 11	GEB 24 x Ptb. 15	. 1955	150	October, November	..	Tirunelveli,	3000	Fine white; Late Planting.

(MADRAS-2)

19	Bans 3 Bayya- hunda.	(Introduced Be- rthampur).	..	186	June	January	Chinglepet, N. Arcot, Tiruchirapalli, S. Arcot	3000	Fine White; suited to semi-dry areas. Early maturing. Short duration.
20	Culture 6522CO <sub>4</sub> × CO 13.	..	1959	110	June	January	Madurai, Ramana- thapuram, Coimbatore, Tiruchirapalli, S. Arcot	3000	Blast resistant; cosmopolitan.
21	Culture 6538 CO <sub>4</sub> × GEB.24	..	1959	150	June-July	Dec.-Jan.	Salem, Coimbatore, N. Arcot	4200	Fine, Blast resistant.
22	Co 1	Periakichile	1923	155	June	July	Coimbatore, Ramana- thapuram, S. Arcot	3600	Medium white.
23	Co 2	Poomtalai	1923	152	July	September	Coimbatore, Salem, Arcot, Tirunelveli.	3800	Ditto.
24	Co 3	Vellai Samba	1923	160	July	September	Coimbatore, Tiru- chirapalli, S. Arcot, Salem.	3600	Ditto.
25	Co 5	Chinna Samba	1926	165	July	September	Coimbatore, Chi- nglepet, N. Arcot, Salem.	3500	Ditto.
26	Co 7	Sadai Samba	1926	157	July	..	Coimbatore, Salem	2500	Translucent white.
27	Co 13	Arupatham Ko- dai.	1940	110	January	June	Madurai, Ramana- thapuram, Coimbatore, Tiruchirapalli, N. Arcot	2500	Medium to Coarse, short duration.

1	2	3	4	5	6	7	8	9	10
28	Co 19	Chinglepet, Seru- mani.	1941	180	July	Sept.	Chinglepet, N. Arcot, Tirunelveli, S. Arcot, Tanjore.	2700	Fine white; Blast susceptible.
29	Co 25 Co 4 x	Adt 10	1954	170	July	January	Salem, N. Arcot, Tanjore.	3000	Medium, Blast re- sistant.
30	CEP 24	Konamani mu- tant Madras-1 (Kichite).	1921	150	June-July	Sept.	Tiruchirapalli	3500	Fine, Cosmopolitan, Table Rice.
31	Niv 19	Sanna Kusuma	..	200	June	..	S. Arcot.	3500	Medium fine.
32	Plr 1	Garudar Samba	..	..	July-Aug.	..	S. Arcot.	3000	Ditto.
33	Ptb 15	Navangin Poon- thala.	..	165	September	..	Tanjore, S. Arcot.	3000	Medium fine; Late sowing.
34	SR 26 B	Orissa.	..	180	July	..	All Districts; Saline areas.	3500	Coarse, saline resis- tant, Coastal land.
35	TKM 1	Pisini	1950	150	August	..	N. Arcot, Chingle- pet.	2000	Dry Paddy.
36	TKM 2	Sambalai.	1950	140	August	..	Chinglepet, S. Arcot.	2000	Ditto.

(MADRAS-5)

(MADRAS-6)

97	TKM 3	Sawarnavari	1950	90	June	..	Chinglepet	3800	Fine } Cosmopolitan Rice } habit; } period bound.
98	TKM 6 GEB	24 x Co 18	1952	110	June	January	All districts	3500	
(B) CHOLAM									
1	Co 1	Periamanjai	1946	135	July-Aug.	..	Coimbatore, Salem, Tiruchirappalli, Chinglepet.	900	Rainfed, Good yielder. Pithy Stalks. Yellow, Striga susceptible.
2	Co 2	Talaivirichan	1946	145	"	..	Coimbatore, Tiru- chirappalli, Salem, N. Arcot, S. Arcot.	1000	Rainfed.
3	Co 3	Do.	1946	145	"	..	Ditto.	1000	Ditto.
4	Co 4	Sen Cholam	1946	90	Feb.-March	..	Salem, Tiruchira- palli, Coimbatore.	2250	Irrigated, Good yield; Small red grains.
5	Co 5	Chinnamanjai	1946	100	March	..	Coimbatore.	2500	Irrigated, Fodder variety, Yellow grain.
6	Co 6	Chitravellai	1946	115	"	..	Ditto.	2250	Ditto.
7	Co 7	Vellai	1946	110	"	..	Coimbatore, Salem, Madurai, Tiruchi- rapalli.	2750	Ditto.
8	Co 8	Enaivelai	1946	100	"	..	Coimbatore, Tiruchi- rapalli.	2600	Do. Very popular.
9	Co 9	Vellai (Kesari)	1946	95	"	..	All districts.	2600	Do. Fodder and grain variety.

1	2	3	4	5	6	7	8	9	10
10	Co 11	Short duration mutant.	Fodder } Grain }	75 100	March	August	Coimbatore, Chinglepet, S. Arcot, Tiruchirapalli, Tanjore.	3000	Irrigated, Fodder and grain variety.
11	Co 12	Uppan or Mottai Vellai.	1950	85 to 90	January	March	Tiruchirapalli, Madurai, Ramana-thapuram, Salem, Chinglepet.	2750	Chalky white.
12	Co. 18	Kesari	1952	85	Feb.- March	Feb.- March	Coimbatore Tiruchirappalli, Tirunelveli, All Distts.	2800	Irrigated, best among white Cholams juicy fodder—Cosmopolitan.
13	Co 9' 19.	Talaivichan	1952	105	July-Aug.	...	Coimbatore	800	Rainfed-White pearly.
14	K1	Mattucholam	1940	130/135	January	September October	Tirunelveli.		Fodder Variety.
15	K2	Vellai Cholam	1944	100	March	January	Tirunelveli, Coimbatore	2250	Irrigated.
16	K3	Periamanjai X Irungal Cross.	1953	100	July-August.	October	Tirunelveli, Coimbatore, Salem.	400 2500	Rainfed. Pithy Stalk. Irrigated good fodder 6000 lb. Yellowish.
17	Tpa. 1	Talaivichan		180	June	...	N. Arcot		Pearly grain.

18 Tpt. 2 . . . Do. . . 180 June . . . N. Arcot, Salem, Ching-  
lepet. . . Chalky grain 50%  
more yield than  
local.

(C) CUMBU

1 Co. 1 . . . Africl Whip 1939 . . . 90 March . June . . . S. Arcot, Tiruchirapalli, Salem, Coimbatore, Ramanathapuram. . . Rainfed Irrigated and Irrigated rainfed.	900 2300	
2 Co. 4 . . . Bombay Early. 1953 . . . 75 July . October. . . Madurai, Coimbatore, Salem, S. Arcot, Tiruchi, Salem, Ramanathanpuram Coimbatore. . . Dry. Irrigated.	900 1800	
3 Co. 3 . . . Kottapullur . 1942 . . . 83 April . June . . . Ramanathapuram, Madurai, Coimbatore. . . Rainfed. Irrigated.	900 2000	
4 Cross 1 . . . Hybrid . . 1950 . . . 90 September . . . N. Arcot, S. Arcot, Salem, Coimbatore, etc. . . Ditto.	800 1000	
5 Cross 2 . . . . . 1950 . . . 90 July-August. April . . . Madurai, Rannad, Salem, Coimbatore, etc. . . . .	..	
6 Cross 3 . . . Hybrid . . 1957 . . . 90 July-August. April . . . Madurai, Rannad, Salem, Coimbatore, etc. . . Rainfed. Very Popular.	1000	
7 K1 . . . Kattu . . 1940 . . . 90 October. February . . . Madurai, Ramanathapuram, Tirunelveli. . . Dry. Irrigated.	800 2000	

1	2	3	4	5	6	7	8	9	10
8	K <sub>2</sub>	. . . Punjab . . .	. . .	90	October	February	All districts . . .	800 200	Dry. Irrigated.
	AKP 2 . . .	. . . Baroda Chodri (Anakapalli)	. . .	85	May . . .	. . .	(D) RAGI Chinglepet, N. Arcot, Salem	600	Irrigated, short dura- tion, Cosmopolitan.
2	Co. 1 . . .	. . . Gidda Aryam . . .	1942	120	May } June } July }	. . .	Chinglepet, N. Arcot, Salem, Coimbatore, Tiruchirapalli, Ma- durai, Ramanatha- puram, Tirunelveli.	900 2700	Rainfed. Irrigated.
3	Co. 2 . . .	. . . Mutti . . .	1942	110	May-July . . .	. . .	Madurai, Ramanatha- puram, Tirunel- veli.	2500	Ditto.
4	Co. 3 . . .	. . . Mutant from Gidda Aryam.	1942	110	May . . .	September	S. Arcot, Coimbatore	2100	Ditto.
5	Co. 4 . . .	. . . Palladam . . .	1942	130/140	August	January	Ramanathapuram	800 2250	Ditto.
6	Co. 5 . . .	. . . Karumaurutti . . .	1953	115	May-June . . .	. . .	Salem, Coimbatore, N. Arcot, S. Arcot, Tiruchirapalli.	2800	Irrigated.
7	Co. 6 . . .	. . . Cross . . .	1953	120	May-June . . .	. . .	N. Arcot, Salem, Coimbatore.	1500	Irrigated White, Nutri- tious, Long duration.

8	Co. 7	.	.	Cuddappah	1953	100	May-June	..	Tiruchirappalli, S. Arcot, Chinglepet, Coimbatore.	2600	Irrigated White; Nutritious, Short duration, Coimbatore.
9	K1	.	.	Koilpatti	1940	110	July	September	Tirunelveli, Ramnathapuram.	2500	Irrigated.
10	K2	.	.	Karumuratti.	1954	135	July	..	Paris of Madurai, Ramnad Tirunelveli	2750	Ditto.
11	P1r 1	.	.	Perum Ragi	1942	110	April-May	..	South Arcot	2000	Ditto.
(E) TENAI											
1	Co. 1	.	.	Mosur Tanai	1942	100	March	September	S. Arcot, Coimbatore, Salem	600 7000	Rained to Irrigated. Irrigated & Rained.
2	Co. 2	.	.	Sadaai Tenai	1942	90	March	..	S. Arcot & Madurai.	1000	Irrigated.
3	Co. 3	.	.	Perumu Tenai	1942	100	September	..	S. Arcot, Madurai.	800	Rained.
(F) SAMAI											
1	Co. 1	.	.	Local	1955	90	Sept.-Oct.	..	Salem, Coimbatore.	400	Rained 20% higher than local. Short duration.
(G) PANTAVARAGU											
1	Co. 1	.	.	Local	1959	90	Nov.-Dec.	..	Coimbatore, Tirunelveli, Madurai, Ramnad	600 1200	Rained Rainfed 10% increase. Irrigated rainfed.



1	2	3	4	5	6	7	8	9	10
(H) VARAGU									
1	Co. 1	Coimbatore Local.	1953	140	July-Aug.	..	All Districts—Madurai Coimbatore.	700	Rainfed. Yields 15% over local.
2	Co. 1	Palur local	..	125/130	Do.	..	Chinglepet, N. Arcot, S. Arcot.	700	Rainfed.
(I) KUDIRALVALI									
1	P. C. 49	Local	1959	120	Sept.-Oct.	..	Tirunelveli, Coimbatore.	500	Compact
(J) RED GRAM									
1	Co. 1	Local	1953	180	June-Aug.	..	All Districts	800/1200	Rainfed.
(K) HONZORAM									
1	Co. 1	Local	1957	130	Oct.-Nov.	July-Aug.	Coimbatore, Ramnathapuram, All District	500-1600	Rainfed. Yields 60% seeds, more than local brown. Pure crop. Also mixed crop with Ground-nut.
(K) A GREEN GRAM									
1	Co. 1	Local	1953	135	June-July	Sept.-Oct.	All Districts	400-500	Rainfed.

(L) BENGAL GRAM

1 Co. 1 . . Local . . 1953 145 Nov. . . Coimbatore . . 500 Rainfed.

(M) GROUNDNUT

1 TMV 1 . . Spreading . . 1940 135 July-Aug. Feb-March Almost all districts  
(Rainfed.) (Irrigated) particularly, Ramana-  
nathapuram, Madurai  
Easily harvested.  
Rainfed. Partially  
Irrigated resistant  
to drought Tikka,  
Seeds dormant 50%  
oil.

2 TMV 2 . . Bunch . . 1940 110 Do. Do. N. Arcot, Ramana-  
thapuram, Tirunel-  
veli, Tanjore.  
Rainfed. Irrigated.  
Easily harvested.  
49% oil.

3 TMV 3 . . Spreading . . 1943 135 Do. Do. Almost all districts,  
S. Arcot, N. Arcot,  
Salem.  
Rainfed. High shelling  
77% suited for  
drill sowing.

4 TMV 4 . . Spreading . . 1947 135 Do. Do. S. Arcot, Salem,  
Tiruchirappalli, Ma-  
durai.  
Irrigated Higher yield  
50% oil.

(N) GINGELLY

1 TMV 1 . . Local . . 1940 85 October- February-  
November March  
S. Arcot. N. Arcot, 250 rainfed  
Chinglepet, Salem, 500 irrigated.  
Coimbatore, Tir-  
chirappalli, Tira-  
nevelveli.

2 TMV 2 . . Local . . 1945 85 December . . 300 rainfed  
Higher yielder 52%  
oil cold weather.

1	2	3	4	5	6	7	8	9	10
3	TMV 3 .	. Local	. 1947	80	..	February- March (Irrigat- ed).	S. Arcot, Coimbatore, Tanjore.	500 irrigated	Higher yielder mer crop short duration 52% oil.
(O) CANTON									
1	TMV 1 .	. Local	. 1943	..	June-July- August.	..	..	150 Kernal pure crop.	
2	TMV 2 .	. Local	. 1943	210	Do.	..	Salem, Coimbatore, S. Arcot, N. Arcot.	150 Ditto. 50 to 75 Mixed crop nonde- hiscent.	
3	TMV 3 .	. Local	. 1945	240	Do.	..	..	150 Kernal Pure High oil content 55%.	
4	Co 1 .	. Coimbatore- Local	..	Peren- nial	June-July	..	..	Perennial 55% oil.	
(P.) COTTON									
1	K 2 .	. Multiple Ccr- minum.	1948	8	October- November.	..	Madaurai, Rama- nathampuram. Ti- runeveli.	Staple Ginning-count. Lint.Lb.inches	
								110 to 120 28/32 to 32 30/32	29 rained.

2	K 5	.	.	Do.	1941	8	Do.	..	Coimbatore, Tirchi- rapalli, parts of Ma- durai.	100 to 125—Do.—30 28	Do.
3	K 6	.	.	Multiple Cer- num.	1954	8	Oct. Nov.	..	All rainfed district.	30 to 140 28/32 to 30/32.	32 33 Rainfed.
(PANDYAN)											
4	MCU 1	.	.	Cambodia Uganda.	1943	6½	September	(Irrigated) (Rainfed)	Coimbatore, Salem	Rainfed 100 to 125 Irri- gated 250 to 300.	1' 35 41 Rainfed irri- gated.
5	MCU 2	.	.	Do.	1953	5½	Summer irrigated March.	..	Ramnad, Madurai.	Irrigated 250 to 300.	1' to 1 1/16 33 45 Summer.
6	MCU 3	.	.	Do.	1954	6½	Sept.—Oct.	..	All cotton irrigated districts.	Rainfed 130 to Irrigated 140 300 to 320.	1 1/32 to 1/16 38 45 resistant to Pem- phers.
(PONGAL)											
7	P. 216 F	.	.	Punjab American	..	4.5	Feb.—Mar. (Irri.)	..	Tanjore, S. Arcot, Tiruchirapalli.	Irrigated(200) Tanjore (400 Coimbatore) Rainfed 200- 300	7/8 to 15/16 33 38 Rice follow.
(Q) SUGARCANE											
						Months					
1	Co 419	.	.	Poj 2878 XCo 290.	..	12	Feb.—Apr.	..	Factory and Gur area.	35 to 40	Poor juice. Hard Purple rind 9% recovery.

1	2	3	4	5	6	7	8	9
2	Co 449 .	Poj 2878 X Co 331 cross.	..	12 Feb.-Apr.	..	Factory areas	35 to 40	Erect with swollen nodes greenish Yellow stem. 9 to 10% recovery.
3	Co 527 .	Co. 349 Do. X Co. 312.	..	11-13 Dec.-Jan. August (Adsali).	..	Factory areas	35 to 40	Medium Pink Swollen nodes 9 to 10% recovery.



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## APPENDIX II

*Average annual rainfall (Madras States) (Millimetres)*

District	South West Monsoon June-Sept.	North East Monsoon	Total including others	Percentage of North East Mon- soon to the total
The Nilgiris . . . .	1,059	496	1,891	26
Kanyakumari . . . .	551	552	1,471	38
Chinglepet . . . .	397	689	1,188	58
South Arcot . . . .	398	641	1,183	54
Thanjavur . . . .	288	678	1,143	59
North Arcot . . . .	447	387	966	40
Tiruchirapalli . . . .	315	395	880	45
Salem . . . .	360	288	825	35
Madurai . . . .	226	399	820	49
Ramanathapuram . . . .	186	449	816	55
Tirunelveli . . . .	110	487	809	60
Coimbatore . . . .	200	315	694	45

## APPENDIX III

*Quantity of paddy seed distributed by Registered Growers (Results of Survey in Madras)*

Name of Centre	Area (Acres)	Area of seed farm raised	Quantity of seed produced paddy	Quantity of seed distributed
			Tons	Tons
Musiri . . . . .	15,420	344	480	61
Kancheepuram . . . . .	44,584		360	162
Chinglepet . . . . .	22,446	627	559	229
Tirupur . . . . .	491	35	40	5
Gobi . . . . .	16,317		320	20
Uthukuli . . . . .	1,697	16	9	11
Vellore . . . . .	4,243	28	23	15
Vaniampadi . . . . .	15,714	20	19	14
Thirunavellur . . . . .	9,934	132	88	5
Panruti . . . . .	7,341	78	20	10
Kalayarkoil . . . . .	26,376	125	80	45
Aruppukottai . . . . .	2,265	78	2	1
Mudukalathur . . . . .	13,105	10	..	..
Tirupathur . . . . .	19,681	96	17	3
Sivaganga . . . . .	15,844	48	11	5
Avidikoil . . . . .	12,212	..	12	1
Muthupet. . . . .	31,153	126	124	103
Sankanarkoil . . . . .	1,22,774	906	383	383
Mayavaram . . . . .	21,880	168	410	175
Thirukattupalli . . . . .	68,387	434	140	84
	4,71,316	3,271	3,097	1,332

## APPENDIX IV

*Estimated area under improved strains in the Madras State (Departmental figures)*

	Total area 000 acres		Estimated area under improved strains (000 acres)		Percentage of area under improved strains	
	1957-58	1958-59	1957-58	1958-59	1957-58	1958-59
Paddy . . .	5,805	5,712	3,027	3,713	54	63
Sorghum . . .	1,754	1,846	770	941	50	51
Cumbu (Bajri) . . .	1,384	1,489	700	789	51	53
Ragi . . .	905	8,530	650	602	63	68
Minor Millets . . .	1,417	1,476	250	364	21	25
Groundnut . . .	1,805	1,840	512	528	28	28
Gingelly . . .	361	384	114	124	32	32
Castor . . .	49	45	30	33	67	72
Sugarcane . . .	N.A.	120	N.A.	118	N.A.	98
Pulses . . .	1,169	1,094	250	306	21	28
Cotton Irrigated . . .	N.A.	250	N.A.	225	N.A.	90
Cotton Total . . .	N.A.	1,123	N.A.	692	N.A.	92



## APPENDIX V

### *Pilot survey of the area under improved strains of Paddy, Madras*

Each district was taken as a unit and for every 2500 acres, one village was taken for study, by random sampling of villages. In each village survey numbers were chosen at random. Provision was not made for choosing alternate numbers, when the chosen number did not come under the crop or was not available. Because of this, the number of samples got was only 1119 against the target of 2000.

The concept of an improved paddy strain was taken as any holding where the initial supply of improved seed was got from an outside recognised source, within the five years previous to the enquiry. The rest were taken as not growing the improved strains.

The work was conducted by the agricultural demonstrators and extension officers with the help of trained fieldmen and gramsevak. They were supplied with the particular characteristics of each improved strain for indentifying the variety with the list of local names, as the same variety often goes by different names.

For interpretation of data, the area under improved strains was determined as percentage of the total of such areas of all holdings in the villages of the district, to the total area of the holdings for the crop. A percentage was thus worked out for each district. As the survey covered the main crop period from November to January, it was assumed that the proportion under improved strains for the crops was the same for all seasons. For the State as a whole, the percentage of area covered in the community blocks and non-block areas is given below :

*Percentage area covered by improved strains of paddy 1958-59 (Pilot survey)*

Name of Revenue District	No. of villages sampled	Area under Paddy (000 acres)	Percentage of area under improved strains		
			Blocks	Others	Whole dist.
1	2	3	4	5	6
Tanjore . . . . .	342	1400	72	38	58
Chinglepet . . . . .	187	692	49	74	58
S. Arcot . . . . .	127	686	78	81	80
N. Arcot . . . . .	122	638	87	78	82
Tiruchirapalli . . . . .	102	545	47	74	67
Ramanathapuram . . . . .	56	445	49	37	45
Madurai . . . . .	47	360	68	76	69
Tirunelveli . . . . .	52	320	26	68	53
Salem . . . . .	46	270	52	86	66
Coimbatore . . . . .	18	200	83	59	76
†Kanyakumari . . . . .	20	140	0	6	4
<b>TOTAL . . . . .</b>	<b>1119</b>	<b>5704</b>			<b>63%</b>

†Low because it was recently integrated with Madras from Kerala.

The estimated area under improved strains for the whole State was 63 per cent in paddy, the greatest intensity being in North Arcot, Salem and Coimbatore, both in block and non-block areas.

Data were collected for the percentage area under each variety for the districts and the figures for the major varieties in the main season were as below :

*Percentage distribution of each improved strain in each of the different districts  
(Name of strain and %)*

District	GEB 24	CO 19	CO 25	BAM 3	ASD 5	TKH 6	CO 2	ADT 8	ADT 10	ASD 4	Others
Chinglepet	14	33	1	33	..	2	..	..	..	..	17
N. Arcot	71	7	2	6	..	..	2	..	..	..	13
S. Arcot	2	30	27	32	..	1	4	..	..	..	4
Tanjore	1	4	43	..	..	..	..	10	14	..	28
Tiruchirapalli	21	12	11	..	22	4	..	1	..	..	29
Madurai	8	48	2	10	10	..	..	..	1	..	21
Ramnad	..	13	..	7	2	..	11	3	..	41	33
Tirunelveli	..	9	34	..	44	..	..	..	..	10	3
Salem	57	..	8	..	..	..	10	..	..	..	25
Coimbatore	25	13	21	..	..	4	..	..	..	..	37

For each strain, the popularity was determined in the Pilot survey by an average of the percentages of the number of holdings growing the strain, to the total number of holdings in the districts where it is grown, and an assessment of popularity made as GEB 24-25 per cent, CO 19-19 per cent, CO 25-17 per cent, ASD-5-20 per cent, BAM 3-17 per cent for the corresponding growing districts, but this method is objectionable as it does not give weightage to areas. A more appropriate method is given in the, Table on next page.

A survey on similar lines with improved sampling technique is being undertaken for millets, and the reports so far got shows a spread of 48 per cent for cholam, against a departmental estimate of 51 per cent. Although the methods employed in this survey in sampling and technique can be improved, it has given useful results.

# APPENDIX VI

## *Estimated area covered by selected improved strains of rice—1958-59 Madras*

Name of strain	Area covered (000 acres)	Percentage to the	
		Area under improved strain	Total under Rice
GEB 24 . . . . .	681	19	12.0
CO 25 . . . . .	660	19	11.6
CO 19 . . . . .	591	16	10.4
BAM 3 . . . . .	378	10.6	6.6
ASD 5 . . . . .	184	5.1	3.2
ADT 10 . . . . .	115	3.2	2.0
ADT 8 . . . . .	111	3.2	2.0
ASD 4 . . . . .	99	2.8	1.7
Other strains . . . . .	780	21.2	13.5
Not covered by strain . . . . .	113	..	37.0
TOTAL . . . . .	5712	..	100.0

## APPENDIX VII

### *Area under Cotton Strains (000 Acres) Madras.*

	CO 2	MCU 1	MCU 2	Karun- ganni 2	Karun- ganni 5	Total
1955-56 . .	30	105	59	257	116	567
1956-57 . .	..	108	60	262	122	552
1957-58 . .	..	122	71	260	122	575
1958-59 . .	..	130	72	359	142	703
1959-60 . .	..	151	74	320	145	690



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## APPENDIX VIII

### *Methods of Producing Nucleus Seed—Madras*

In rice produce of selfed plants of the particular strain are grown in nursery cleared of all previous crop and the seedlings after roguing are transplanted into separate fields, rogued three times during growth, flowering and before harvest, and the seeds harvested separately, dried, bagged and sealed for distribution to the multiplying farms.

In sorghum and other millets pure nucleus seeds are maintained by the concerned specialists or the assistants specialists from plants true to type of the particular strains. For this purpose, every year 10 to 20 selfed single plants are grown. The selection that conforms to the normal is marked for nucleus seed. Seeds from selection so fixed are multiplied under careful conditions in a larger area every year and distributed to state seed farms and extension staff, the supply to ryots being restricted to a minimum, if at all.

In groundnut, where natural crossing is negligible and where the rate of multiplication is low, the following method is adopted, especially as two of the strains TMV TMV 3 are mass selections. At the breeding station a large number of type plants with the desired standard of morphological and economic characters are selected and their produce pooled to form the primordial nucleus seed which, as the seed rate is high, will suffice for only 10 cents. This is again multiplied in areas of half to one acre in the next season under careful systematic roguing and supervision. This seed so multiplied is despatched to what are called zonal nucleus farms of 50 acres each of which there are four in number, under the control of the Oil Seeds Development Officer and technical assistants of the Specialist's section. The zonal nucleus farms multiply the seed in two stages (primary and secondary) under roguing and supervision to produce enough seed to distribute to selected growers, or sometimes to State Seed Farms.

In gingelly where the rate of multiplication is high the pooled produce of outstanding type plants from the nucleus plot is utilised for multiplication at the main breeding station itself, over half to 10 acres and then sent to the extension staff for distribution to Registered seed farm ryots.

In castor where natural crossing is high, the nucleus plot of the pure strain is raised in an isolated place removed from contamination from other types. The progeny of the most outstanding type plants of the strain strictly conforming to the expected standards are pricked out and their produce gathered individually. The progeny rows of the selections are raised in the next season in another isolated block, and after examination of morphological characters and yield figures, the produce of those yielding more than the general mean are pooled and utilised for raising the bulk nucleus plot, in isolated areas of one acre after roguing. The seed got is further multiplied in zonal nucleus farms under careful supervision and roguing, for distribution to primary seed farms through the extension officers.

In cotton, progeny of selfed plants were multiplied in stages, but now for a rapid multiplication, the following phased programme in three stages is adopted to ensure the economic advantages of the strain K 6. The first phase of production of pedigreed seed is on the lines of Dr. Harland's "mass pedigree system" in the primordial stage by growing in progeny rows a large number of single plants samples, which have passed the normal test, examining all the single plants of the lines passing the bulk norm test and selecting an 'elite' of about 500 plants for starting another multiplication cycle, and mixing the bulk seeds of line which pass the 'norm' test. In the second test a nucleus plot in about 8 acres is started from seeds of seeds of the first phase and in the third phase the whole produce of the second phase is raised in about 40 acres. The produce from this is given to extension staff for primary seed farms the cycle being repeated every year. Spinning tests are done in the 2nd and 3rd phases while lint length and productivity are watched at every stage.

The above method is useful for rapid multiplication of new releases of cotton of partially self-pollinated crops or for mass selections as this will save a generation or two before the registered stages but is not applicable to all crops.

## APPENDIX IX

### Case studies of State Seed Farms—Madras State

*Thanjavur District :*

(1) *Sakkotai*.—The area of the farm was 30.8 acres. It was taken on lease in the first year and later acquired at Rs. 73,163/- or Rs. 2374/- per acre. The soil is alluvial and medium light clay. Yield per acre of paddy was 2360 lb., 2236 lb. and 2883 lb. for Kurwai (Adt 20) and 1380 lb., 1700 lb. and 2640 lb. for Co 25 in the past three years. Irrigation facilities are available for about 21 acres with electric motor and filter point. Production of foundation seed ranged about 35 tons per year of paddy to cover about 1,50,000 acres of general crop once in four years.

*The running costs and receipts were:—*

	Expenditure (Rs.)		
	1957-58	1958-59	1959-60
Lease . . . . .	6468	..	..
Establishment . . . . .	1699	2471	2306
Other charges . . . . .	8974	8818	8733
TOTAL	17141	11289	11039
Income . . . . .	11733	11560	16295
Loss (—) or Gain (+)	(—)5408	(+ )271	(+)5256

In the third year the farm was able to meet even the interest on capital and establishment charges.

(2) *Marudanellur*.—This farm with an area of 30 acres was taken on lease in the first year at 6627 and acquired in 1958 at Rs. 76674/- or Rs. 2554/- per acre. About 25 acres are irrigated with double crop facilities. Soil is clay loam. Production of seed was 40 tons of paddy strains (Adt. 20 and second crop varieties). The financial details are as follows :—

	Expenditure (Rs.)		
	1957-58	1958-59	1959-60
Lease . . . . .	6627	..	..
Establishment . . . . .	1699	2471	2306
Other Charges . . . . .	10221	8962	10706
TOTAL	18547	11433	13012
Income . . . . .	12441	14074	22323
Loss (—) or Gain (+)	(—)6106	(+)2641	(+)9311

The farm was able to meet even interest on capital and establishment charges by the third year. In both farms leasing was found uneconomic. After acquisition they are both able to meet even interest on capital.

*Ramanathapuram District:*

(3) *Devadanam Seed Farm.*—The area of the farm was 52 acres. The average yield of paddy Co 2 was 2133 lb in 1959-60 of groundnut 909 lb. and MCU Cotton 768 lb. Seed production of paddy rose from 35 tons in 1957-58 to 48 tons in 1959-60.

The expenditure and receipts were as follows :—

	1957-58	1958-59	1959-60
Establishment and running expenses . . . . .	14516	24983	30715
Receipts . . . . .	10191	15597	48474
Profit (+) or loss(—) . . . . .	(—)4325	(—)9386	(+)17759

The farm which worked under losses for the first two years has made profit in 1959-60 which can meet even interest on capital.

*South Arcot District :*

(4) *Vellappakkam Seed Farm.*—This is a leased farm of 85.6 acres of which 35 acres are irrigated. The lease ranged from Rs. 100 per acre for dry lands to Rs. 215/- per wet lands. There are five bore wells fitted with departmental Electric Motors. Eight strains of paddy are grown the chief being TKM 6, GEB 24 and BAM 3 and the production was 83 tons besides 11 tons of ragi.

Financial Statement (Rs.)			
	1957-58	1958-59	1959-60
Lease . . . . .	..	7962	10076
Establishment . . . . .	170	3774	6108
Other charges . . . . .	1024	11984	32120
TOTAL . . . . .	1194	23720	48304
Income . . . . .	..	8973	53079
Profit (+) or loss (—) . . . . .	(—)1194	(—)14747	(+)4775

Being a large farm it has been able to meet establishment charges as well as lease in the third year. The staff consists of one Farm Manager, One clerk, one fieldman, two maistries and and one watchman.

*Chinglepet District:*

(5) *Kolandalur Seed Farm.*—This farm of 50.7 acres, all garden land, was first leased and later acquired on 1-4-58 at a cost of 1,1,15,791 or Rs. 2284/- per acre. There are five wells, three fitted with electric motors. The cropping in 1959-60 was 9.5 acres of paddy Sornavari, 33 acres under early samba, 7.91 under late samba and 12 acres under Navarai, Main varieties multiplied are TKM 6, SR 26 B and BAM 3, besides other crops as Co 2 ragi and TMV 2 groundnut. Yields per acre were 2930 lb. for PTB 15, 2600 lb. for SR 26 B, 1530 lb. for TKM 6, 2120 lb. for BAM 3, and 2100 for CO 25. About 46 tons of pure seed of paddy were produced in 1959-60 to cover roughly one lakh of acres of crop once in four years. The production of seeds increased from 6 tons in 1957-58 to 17 tons in 1958-59, and 64 tons in 1959-60, and the farm is giving increased production every year.

The staff consists of one Farm Manager, one clerk, one maistry and one watchman.

The financial details are as follows :

	Financial Statement (Rs.)		
	1957-58	1958-59	1959-60
Lease . . . . .	9353	..	..
Establishment . . . . .	..	4500	4500
Other expenses . . . . .	9451	13269	15980
<b>TOTAL EXPENSES</b> . . . . .	<b>18804</b>	<b>17769</b>	<b>20480</b>
Income . . . . .	1035	9665	22085
Profit (+) or loss (—) . . . . .	(—)17769	(—)8104	(+ )1605

The Farm has been able to meet the cost of establishment current expenses and part of the interest on capital by the second year of purchase and the income is increasing every year. The yields are good.

*Coimbatore District:*

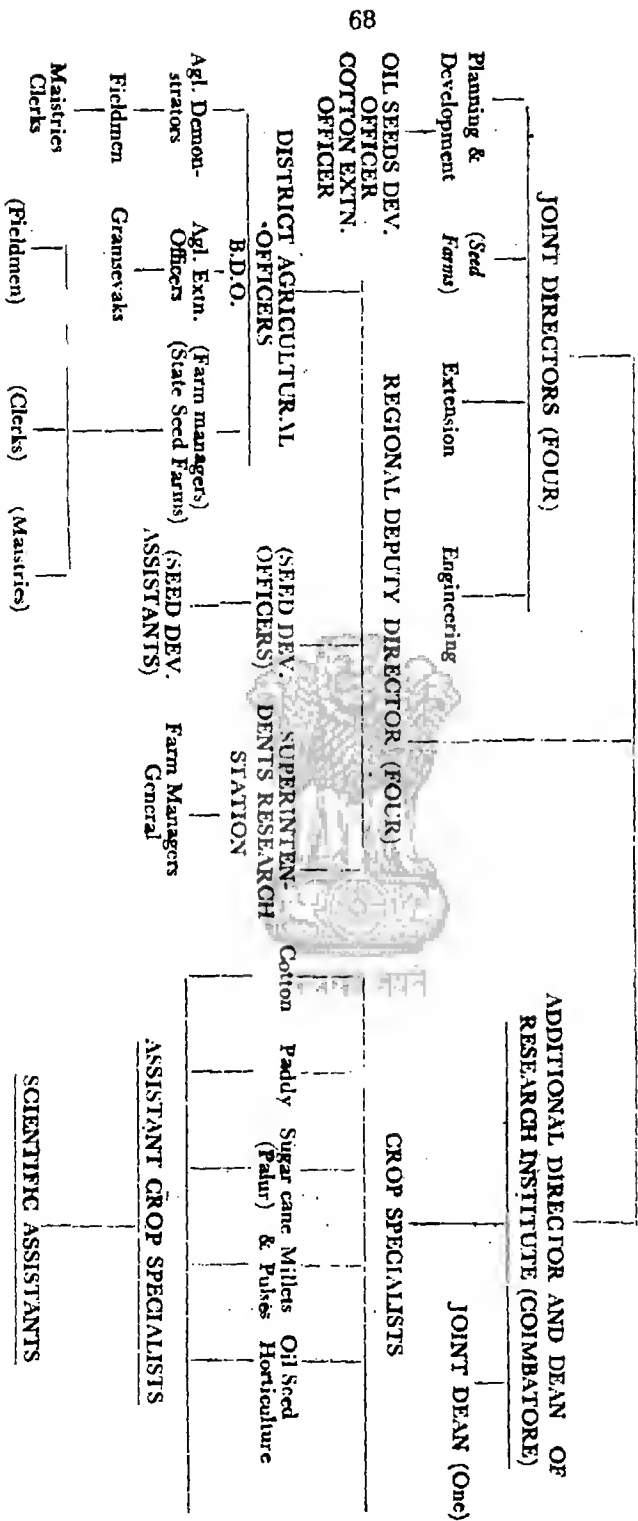
(6) *State Seed Farm Pongalur .*—The area of this State Seed Farm is 25 acres, all garden land. The cropping in 1959-60 was Cotton 21½ acres (MCU1), Cholam (Co 18 and Co 12) 18.4 acres and Co 2 ragi (3.11 acres); Cotton is followed by ragi and jowar four varieties of Cholam were grown in 1956-57, but now only two irrigated types are grown. The yields per acre during 1959-60 were 1641 lb. of MCU 1, 1059 lb. of ragi Co 2, 1411 lb. of Cholam Co 9. The distribution of foundation seed from the farm of improved varieties were as follows :—

	Quantity of improved seed distributed (tons)			
	Cotton	Cholam	Cumbu	Ragi
1957-58 . . . . .	9.5	4.1	1.7	3.9
1958-59 . . . . .	14.8	9.1	1.4	2.6
1959-60 . . . . .	14.3	7.6	..	4.5



# APPENDIX X Set up of Agriculture Department in Madras State

*Director of Agriculture, Madras (I. A. S. with special pay)*



*N.B.*— Items in brackets are specially employed for seed work.

## APPENDIX XI

### *List of places Visited and Persons Interviewed*

(7th July to 16th July 1960)

- Officials* . . . Director of Agriculture, Madras.  
 Additional Director and Dean.  
 Joint Director of Agriculture (Seed Farnis).  
 Joint Dean.  
 Joint Director of Agriculture (Package Scheme).  
 Cotton Specialist.  
 Millet Specialist.  
 Paddy Specialist.  
 Oil Seeds Specialist.  
 Deputy Director of Agriculture (Madurai).  
 District Agricultural Officer, Shivaganga, Madurai.  
 District Agricultural Officer, Tirunelveli.  
 Assistant Cotton Specialist, Koilpatti, Tirupur.  
 Farm Managers of State Seed Farms.  
 Agricultural Extension Officers.
- Community and N. E. S. Blocks visited* Koilpatti  
 Kumbakonam.  
 Kallapatti (15-7-60).
- Agricultural Research Stations.* Agricultural College, Central Farm, Coimbatore.  
 Paddy Breeding Station, Coimbatore.  
 Millet Breeding Station, Coimbatore.  
 Cotton Breeding Station, Coimbatore.  
 Oil Seeds Breeding Station, Coimbatore.  
 Sugarcane Breeding Station, Cuddalore (10-7-60).  
 Agricultural Research Station, Aduthurai (Paddy) (11-7-60).  
 Agricultural Research Station, Koilpatti (Cotton, Millets).  
 Agricultural Research Station, Tindivanam.  
 Agricultural Research Station, Tirurkuppam (Paddy).
- Registered growers and Cultivators.* Village Seed Farm Grower, Bukkadore.  
 Aurobindo Ashram, Pondicherry.  
 Four Village Seed Farm Growers, Krishnapuram, Tanjore District.  
 Four Village Seed Farm Growers, Poondi, Chinglepet District.  
 Village Seed Farm Growers, Kaivandor, Chinglepet District.  
 Meeting of Village Seed Farm Ryots, Aduthurai, Tanjore.  
 Meeting of Virandur Growers (Chinglepet District).  
 Mellikuppam Sugarcane Growers.  
 Cotton Growers meeting (Tirupur).
- State Seed Farms* . Vellappakam, S. Arcot District.  
 Kolandalur, Chinglepet District.  
 Krishnapuram, Tanjore District.  
 Poondi Seed Depot (Chinglepet District).  
 Sekkottai, Tanjore Dist. (11-7-60).  
 Marudanellur, Tanjore District.  
 Devadanam, Ramanathapuram District (13-7-60).
- Co-operative Societies.* Srivalliputtur Uganda Cotton Grower's Co-operative Society.  
 Tirupur Cooperative Society, Mct Cooperative Members.  
 Deputy Registrar of Cooperative Societies, Srivalliputtur.
- Other Schemes* : Package Scheme, Tanjore.

(A meeting was held with the Dean and Additional Director of Agriculture, Crop Specialists at Coimbatore and one with the Director of Agriculture, Madras).

## APPENDIX XII

### *Case Studies of Research Stations (Madras)*

(<sup>1</sup>) *Rice Research Station Tirur Kuppam*

Visited —8-7-60

The station was established in the year 1942 with 42.3 acres of land of which 38 acres are cultivated, under Samba (20 acres), Swarnavari (9 acres) and Navarai (8 acres) seasons. Six strains have so far been evolved in the station, of which TKM 6 derived from a cross between Co 18 and GEB 24 has both good quality and yield, and is a cosmopolitan type capable of replacing G.E.B. 24 and short duration varieties in many districts.

Besides the six strains evolved in the station, it is also multiplying 16 other varieties.

Forty two progenies of Indo-Japanica derivatives were under trial with G.E.B. 24 as Standard under high fertility conditions. Research work is carried out for evolving drought resistant varieties and those suitable for semidry areas. The distribution of nucleus seed was 39,400 lb. during 1958-59.

It was found in manurial trial that there was no difference between ammonium chloride, and ammonium sulphate applied to paddy with the same doses of nitrogen. In the seed rate experiments in broad cast paddy, a seed rate of 60 lb. per acre was found as the optimum.

The object of the farm is to evolve improved strains for the region for the seasons Swarnavari, Samba and Navarai. The selections TKM 1 and TKM 2 are suited for dry-paddy in the Samba season, and TKM 3 for Swarnavari. The variety TKM 6 is an outstanding selection and can be grown in all seasons.

The staff employed were one Superintendent (Gazetted) and three technical assistants. The income during the year 1958-59 was Rs. 22,384 and expenditure Rs. 48,114. The Team suggested that the number of varieties multiplied are too many and should be reduced.

*Agricultural Research Station Tindivanam (S. Arcot District)—*

This station started about 25 years ago, is the main research station for groundnut and other oil seeds. Besides, the Oil Seeds Specialist with headquarters at Coimbatore, has a main station there for research on gingelly and castor and also for groundnut research.

The object is to evolve high yielding strains of groundnut with a high Oil content, and other desirable characters. The following strains from the station are under distribution :

Name of strain	Quantity of nucleus seed distributed lb. 1959-60	Remarks
Groundnut TMV 1 . . .	830	Spreading both irrigated and rainfed.
TMV 2 . . .	2149	Bunch variety both irrigated and rainfed.
TMV 3 . . .	1711	Spreading type, rainfed.

Name of strain		Quantity of nucleus seed distributed lb. 1959-60	Remarks
	TMV 4 . . .	22	Spreading type for fainfed areas and irrigated.
	TOTAL . . .	4712	
Gingelly	TMV 1 . . .	373	
	TMV 2 . . .	1953	
	TMV 3 . . .	471	
	TOTAL . . .	2797	
Castor	TMV 2 . . .	1308	
	TMV 3 . . .	742	
	TOTAL . . .	2050	

The Team noted that due to the low multiplication rate for groundnut, the nucleus seed produced is not enough. To saturate the area, it will have to be multiplied in four stages before it reaches the cultivators. For every 100 lb. of nucleus seed, the area covered is only 2500 acres.

The Team was of opinion that there should be more area under nucleus and seed farms. There should be also more research to evolve strains for rainfed areas.

The staff comprised 4 graduate assistants one for each crop groundnut, gingelly, castor and general under a gazetted superintendent. The expenditure was Rs. 73,945 during 1958-59 and receipts Rs. 15,755.

The last groundnut strain was released in 1953. Of the 17 selections under trial in the district, the following namely, AH 6719 (big seeded), A.H. 6481 (dormant bunch) and A.H. 6279 (bunch) have proved superior and are to be released for large scale cultivation.

The adoption of wider spacing to groundnut was found beneficial and the practice is to be transmitted to ryots.

#### ZONAL NUCLEUS FARM TINDIVANAM

Trained assistants from the oil seeds section are in charge of the Zonal nucleus farms to maintain the purity of seed and to multiply it, in two more stages. The quantities of nucleus seeds produced in the Tindivanam Zonal Nucleus Farm were as follows :—

#### Quantity of zonal Nucleus Seed Distributed (lbs.)

Crop	1957-58	1958-59	1959-60
Groundnut . . . . .	18642	10154	21663
Castor . . . . .	1120	685	300

The Team observed that the quantity produced is inadequate as the multiplication rate is low for this crop. More production of nucleus seed, more area under groundnut in State Seed Farms, and two more stages with registered growers will be necessary to cover a reasonable area with improved strains.

(3) *Agricultural Research Station, Aduturai*

Visited—11-7-60

This station was opened in the year 1922 for evolution of improved high yielding strains of paddy both by selection and hybridisation to replace local varieties grown by the cultivators and to find out the best agronomic and manurial practices to be recommended for adoption in order to increase production. The area of the farm is 50 acres.

A total number of 25 strains have been released for general cultivation. Of these, three are of hybrid origin and the rest are by pure line selection. Nearly 60% of the area under paddy in Thanjavur district is estimated to have been covered by the improved strains released from this station. Every year about 1,25,000 lb. of paddy nucleus seed of 10 strains, and 2700 lb. of cotton seed are being distributed from this station for further multiplication in State Seed Farms.

For manuring paddy crop, dosage of 5,000 lb. green leaf plus 150 lb. superphosphate as basal dressing and 100 to 150 lb. of ammonium sulphate as top dressing, is recommended. Among the annual green manure crops, *Sesbania speciosa* is found to be the best for growing as a pure crop in rice fallows in summer months, since it yields up to 60,000 lb. of green matter per acre. It is also easy for a cultivator to produce his requirements of sesbania seed by growing it as a border crop in rice fields. Among the perennials, *Gliricidia maculata* is found to be the best suited for planting along channel bunds and fences and for lopping of green leaves.

*Cotton in Rice Fallows.*—Growing of cotton (P. 216F) in Rice fallows in summer months without detriment to the succeeding paddy crop and realising a profit of about Rs. 200 per acre is being recommended for adoption by ryots.

*Filter point tube wells.*—It has also been successfully demonstrated that filter point tube wells can be sunk without much cost and water pumped out for summer irrigation.

*Research work in progress.*—For evolution of high fertility strains, dormant strains and stiff straw strains, various crosses have been effected between desirable parents and the progenies of these and Indo-Japanica crosses in various generations are under study. Besides, for evolution of strains resistant to *Pyricularia oryzae* or blast disease, hybridization was done and the cross progenies are also under test. Investigations on stem rot disease of rice and stem borer pest of paddy are also under way.

The following practices have been recommended for the area from the station :

- (1) Growing of improved paddy strains as follows :  
Kurwai Adt. 3 (95 days) Adt. 20 (105 days) .  
Samba Adt. 8 (150 days) Co 25 (blast resistant) 180 days.
- (2) Growing of green manure crop *Sesbania Speciosa* and green leaf plants *Gliricidia Maculata* on bunds.
- (3) Punjab 216 F Cotton in rice fallows.
- (4) Sinking of filter point wells for growing in summer cotton crop in rice fallows and early nurseries of paddy in advance of water supply from channels.

The staff comprised one gazetted superintendent, five research assistants for paddy and five fieldmen.

The budget allotment for 1960-61 was Rs. 67,000. The expenditure was Rs. 64,184 during 1958-59 and income Rs. 35,445.

(4) *Agricultural Research Station, Kovilpatti*

The area of this station is 116 acres and there are separate blocks, for red and black soils.

The primary object of research at this Station is to improve the important crops of the tract namely, millets and cotton. Through intensive selection and planned breeding many improved strains in cotton as well as millets were evolved since the inception of the station in the year 1900. The strains that are now being distributed together with their merits over local types are presented in the following table.

TABLE

Crop	Strain No.	Improvement over local
1. Cotton . . .	(1) K. 6 (Pandyan) (2) MCU 2.*	22% More kapas yield. ..
2. Cholam. (Jowar) . . .	(1) K. 2 Vellai Cholam (2) K. 3 Periamanjai Iru- ngu Cholam. (Grain-cum fodder Strain).	15% higher grain yield. 12% straw 30% grain higher yield. Locals used for fodder only.
3. Cumbu (Bajra) . . .	(1) K. 1 Cumbu . . .	10% Higher grain yield.
4. Ragi . . . . .	(1) K. 1 Ragi . . . (2) K. 2 Ragi . . .	18% higher grain yield. 20% higher grain yield and resistant to lodg- ing.

\*Evolved elsewhere. Only seed multiplication is undertaken.

Cotton strain K. 6 will replace K. 2 in this tract and K. 5 in Coimbatore region. The off-take of seeds from the station has rapidly increased. At present nearly 75 per cent of the area of this Research Station is set apart for production of nucleus seeds.

The entire quantity of seeds produced in this Research Station is supplied to the Extension staff. Direct supply to the ryots from the Research Station is restricted to the minimum. The seeds distributed to the Extension staff during the past three years were as below :—

Crop	Strain No.	1957-58 Seeds distributed in lb.	1958-59 Seeds distributed in lb.	1959-60 Seeds distributed in lb.
Cotton . . . . .	K. 6	1428	6660	5550
	MCU. 2	603	947	2657
	K. 2	3093	170	57
<i>Millets—</i>				
Cholam . . . . .	K. 3	1185	1484	2137
	K. 3	2050	5315	2869
Cumbu K <sub>1</sub> . . . . .	..	4032	5128	3691
Ragi K <sub>1</sub> . . . . .	..	693	732	35
Ragi K <sub>2</sub> . . . . .	..	567	695	969

The receipts during 1958-59 were Rs. 15,366 and expenditure Rs. 37,164.

(5) *The Central Sugarcane Research Station, Cuddalore*

The Central Sugarcane Research Station was established at Cuddalore on 17-3-1957 with a view to conduct intensified research in Madras State on various problem of Sugarcane. There are two sugarcane research Sub-stations, one at

Gudiyatham and another a Kulitalai to tackle problems peculiar to those regions. Madras occupies an area of 1,44,000 acres under sugarcane with a total production of 3.5 lakhs tons of jaggery and sugar. There are at present 5 sugar factories in Madras State and 3 more are under construction at Ambur in North Arcot District, Madurantakam in Chinglepet District and Udumalpet in Coimbatore District.

The total area of the station is 136 acres and main item of work is varietal study of selections from Coimbatore Central Sugarcane Station and selection of suitable varieties for the tract.

New varieties found promising at research stations and approved for release by the Department for general cultivation are supplied to progressive growers which can be treated as nucleus seed material. Standard varieties viz., Co. 419, Co. 449 and Co. 527 are also supplied periodically from research stations and may be considered as nucleus seed materials. They are further multiplied in cultivators' field under departmental guidance and supervision in the primary and secondary stages before general distribution.

Under sugarcane development scheme, a unit of 4 maistries and one fieldman assist the special Agricultural Demonstrator (Sugarcane) who arranges for frequent inspection of crop meant for seed and also attends the harvest of crop for selection of seed material. Healthy clumps are selected eliminating smut affected, borer damaged ones and a certificate for freedom from disease is issued by the development staff. Supervision of planting and selection of healthy and disease-free seed in growers field is one of the important activities of the Development wing of sugarcane section. A total area of 16,000 acres was covered under this during 1958-59. This work is being supplemented now by the establishment of four separate nursery centres under Special staff at Karur, Vellore, Coimbatore and Cuddalore.

The growing and distribution of short crop seed material is under the supervision of the department and incentives by way of subsidy and premium both to the purchaser and nurserymen are being paid to popularise short crop material among growers who hitherto were using only tops as seed material.

During the year 1958-59, an area of 1585 acres has been covered in this State under nursery scheme and is enough for supply of seed material to about 12,000 acres.

It is also programmed to have quarantine nursery for supplying disease-free and healthy seed. The object in having the quarantine nursery is to grow canes in an isolated centre far away from the surrounding cane areas with a view to prevent disease incidence and seed material obtained from this have been planted in 55 acres. The East India Distilleries and Sugar Factories Limited at Nellikuppam is also greatly co-operating with the department in raising primary seed for distribution to growers.

The total area raised under nursery and the area covered by planting in Nellikuppam tract for the different varieties are given below.

1959-60		
Varieties	Area raised acres	Area covered (upto March 60) acres.
Co. 527) } Co. 449) } Co. 785) } Co. 658) }	991	3585
Nursery raised upto June 1960 (1-4-60 to 30-6-60).		
Co. 785) } Co. 658) } Co. 527) } Co. 449) }	286 acres.	

Every year about 40 acres are grow to Sugarcane for main season experiments and 10 acres planted with Adsali trials at the Central Sugarcane Research Station, Cuddalore. The soil type at this station is sandy to sandy loams and irrigation source for the entire area is only bore wells. The rotational crops grown on the farm are paddy, Ragi, groundnut and green manure. Details of nucleus seed materials of standard and promising varieties both from short crop and tops supplied to growers (for 1958-59 and 1959-60) from this station are furnished below :—

Varieties	Seed material Tons	
	1958-59	1959-60
Co. 419) } Co. 449) } Co. 527) } Co. 658) } Co. 785) }	40	72

About 22,500 acres were raised with short crop sets during 1959-60.

At present Co. 419 is the major variety in the State and occupies 82% of the total area. Co. 449 occupies 12% and Co. 527, 4% of the area. As a result of intensive study, the varieties Co. 658, and Co. 785 have been found promising and have been released in about 1000 acres in Nellikuppam area both for Adsali and main season planting. Both these varieties have yielded about 5 tons of sugar as compared to existing variety Co. 527 which is showing signs of "running out".

Other items such as nutrition studies on sugarcane with reference to uptake of phosphate and potash, Hawaiian method of cane cultivation, alternate source of nitrogen for sugarcane and studies on control measures for different pests and diseases on sugarcane are being taken up on Agronomy, Chemistry, Mycology and Entomology wings of this station.

The general indications are that there is no response of sugarcane either to phosphate or potash. Urea, ammonium sulphate nitrate and calcium ammonium nitrate were found to be good fertilisers for sugarcane and can be used in place of ammonium sulphate.

The financial aspect of working the farm for the past 3 years is as under :

Details	1957-58	1958-59	1959-60
	Rs.	Rs.	Rs.
Working Expenses . . . . .	39,702	65,414	64,851
Receipts . . . . .	17,546	52,565	66,342

**AGRICULTURAL COLLEGE AND RESEARCH INSTITUTE,  
COIMBATORE 16-7-60**

*Summary of Discussions held with the Dean of Institute and Crop Specialists at  
Coimbatore by the Seed Multiplication Team.*

The Team requested information on the following points :

- (1) Coordination between research and extension,
- (2) Relative position of evolution of strains for rainfed and irrigated areas.
- (3) Reduction in the number of strains particularly for rice,
- (4) A nomenclature and specifications of improved seeds of crops.



- (5) Maintenance of purity.
- (6) Acceptance by the cultivator of strains released.
- (7) Increasing production.

The following information was given :

*Paddy Specialist.*—Efforts are being made to reduce the number of strains and now only 25 are under multiplication for the major part of the area. High rice-yields are due to the strains evolved, irrigation facilities and application of manure. Some varieties & as in Tambarapraní yield 4000 lb. paddy per acre and there is scope for increased production. Cleaning of seed is done with natural breeze.

*Millet Specialist.*—Many varieties from other States were tried in Madras but were found not suitable. Seed from irrigated crop when fully dried is as good as that from the rainfed crop. Hybridisation work has increased the yield in cumbu and production is 5,000 lb. More staff is necessary for increased supply and additional State Seed Farms. Cholam Co 18 is a very good rainfed variety but also did well under irrigation giving double the yield. Ragi Co 7 should be grown both under rainfed and irrigated conditions.

*The Cotton Specialist.*—The number of cotton varieties now released is only five. Irrigated MCU 3 cotton will replace MCU 1, and K3 will replace K2 and K5 in rainfed areas. The difference in the quality of seed between rainfed and irrigated Sorghums is not significant. In regard to roguing, identification is possible only after 2 or 3 months when the operation can be done.

*Oil Seed Specialist.*—There are only four varieties of groundnut and only a few in other oil seeds. Varieties got from other States did not give promising results. Some varieties of irrigated cotton can also be grown rainfed, but the percentage is small. The actual spread of strains to be assessed by a proper survey.

*The Horticulturist.*—said that Potatoes grown in higher elevations give better seed than those from lower levels. Great Scot and Up to date are suited to Madras.

*The Mycologist.*—said that drying of seed is very important. Paddy should be stored at 7 per cent moisture.

*The Joint Director (Extension).*—said that good coordination exists between research and extension staff. Specialists visit Seed Farms and Extension officers also visit Research Stations.

*The Dean.*—said that the high yields are also due to increase in canal irrigation. He said that the characteristics of the different improved varieties have already been communicated to the extension staff. Artificial mean should be adopted for cleaning seed.

The Team made the following suggestions :

- (1) Reduction in the number of varieties should be effected.
- (2) The opinion of the farmers should be consulted as to whether improved varieties are acceptable.
- (3) A note on maintaining purity may be circulated from the research stations to extension staff.
- (4) Characteristics of the different varieties may be published and given to extension staff.
- (5) Specifications may be drawn up for nucleus foundation and registered stage for use of extension workers; and
- (6) More hybrid cumbu should be produced.

#### RESUME OF DISCUSSIONS HELD WITH THE DIRECTOR OF AGRICULTURE ON 7-7-60

*The Director of Agriculture and Joint Director of Agriculture.*—There were 73 strain in the rice of which 38 are under distribution. Evolution of strains is a delicate

process and requires continuous effort to improve the yield and meet such factors as resistance to draught and disease.

They have conducted pilot surveys which show that 63 per cent of the paddy area is covered by improved strains and 48 per cent in cholam. In paddy 90 per cent is irrigated, and water has to be kept in the field. Major paddy area is transplanted under irrigation. Intensive cultivation involving improved methods, fertilisers, transplanting and use of fungicides and pesticides have increased yields of the paddy crops. Sugarcane is heavily manured but the area is small and paddy gets the bulk of fertilisers. In each block there is one depot. Only the required quantity of foundation seed is issued to it. The Land Acquisition Act was amended to take the land on lease and acquire it later, if required. They could not get the best land, but had to go for the second best for State Seed Farms. A ceiling of 2,500 per acre was fixed and lands less than 20 acres were not acquired. At first land were leased. No procurement of paddy and millets is now done, but distribution effected either by sale on cash or by exchange from registered growers to cultivators. The lands of the registered growers are called 'Village Seed Farms' but they are not farms belonging to the State. Ryots will give a reasonable premium for improved seed from depots because it is of better quality. The improved seeds of the registered growers are tested for purity and germination and if found fit are sealed. Quick germination tests are made for paddy and cotton using special chemicals and can be done in three days. Registered growers are paid a subsidy for roguing the crop and sealing. The difficulty of unsold stocks with the Government does not arise as no procurement is done. In groundnut where the rate of multiplication is low, procurement will be necessary to saturate the entire area. In paddy and major millets the area is being saturated every year.

*The Members of the Team*—remarked that there are no adequate strains for minor millets and pulses. Regarding the financial condition of the State Seed Farms, it was stated that there were losses in the beginning, but during 1959-60 they were able to meet the establishment charges and running expenses.

Regarding departmental officers it was said that the pay was recently revised in Madras to start from Rs. 375 on a par with Deputy Collectors and there is sufficient inducement. The pay of top-level research officers has also been revised and they are continuing in their position.

The Leader said that more fundamental research work should be taken up in this country and facilities given for the best standard of work.

#### COTTON BREEDING STATION, COIMBATORE

This station was started 40 years ago. The object was to evolve suitable high yielding strains having good staple and spinning value; for Cambodia, Karunganni, Upam varieties. The work was also carried out at Kovilpatti for cotton. The first pure strain evolved for irrigated areas was CO2 Cambodia, with good yields; but the introduction of hybrids between Uganda × Cambodia gave scope for a number of quality strains with higher yield. These were:

---

MCU. 2 . . . . .	For summer irrigated cotton in Ramana-thapuram, Madurai, Tirunelveli District,
MCU. 1 . . . . .	For winter irrigated crop in all areas.
and later MCU.3 (Pongal 1959)	To replace MCU. 1.

---

The spinning value which was 36 counts with the original Cambodia, was improved to about 45 counts with these varieties.

In rainfed cotton, hybridisation gave scope for improved varieties using multiple crosses of Karunganni and Cernum types. The strains now under distribution are:—

---

K2 . . . . .	for Tirunelveli—Ranmad area.
K5 . . . . .	for Coimbatore—Trichy area.

---

and recently K6 (Pandiyan 1959) to replace the above. The spinning value was increased from 25' before to about 30's now.

There are several schemes financed by the Indian Central Cotton Committee and the State Government from the year 1923 onwards. Research work is now being carried out on summer irrigated cotton. Rainfed cotton, winter irrigated Cambodia cotton besides work on rice follows for which a short duration variety from the Punjab 216F is now being recommended. There is also a scheme for rainfed American cottons at Periakulam for all tracts.

Items of fundamental research taken up are heterosis, wild cotton, perennials, Cytogenetic investigations, and inheritance of economic characters. About 2000 crosses between Asiatic and American cotton and also under study for overcoming sterility through polyploidy or back crosses.

Nucleus seeds distributed were ;

Strain	lb.
MCU. 1 . . . . .	620,000
MCU. 2 . . . . .	719,000
P. 216F. . . . .	82,600
K2 . . . . .	132,000
K5 . . . . .	743,800

The Team recommended the expansion of K6 and MCU.3, so that the whole area is catered by only one variety for rainfed cotton and one for winter Cambodia.

#### PADDY BREEDINGS STATION, COIMBATORE

This was started about 40 years ago. So far 138 strains were evolved under the control of the Paddy Specialist before separation of Andhra and Malabar. The work in the Research Station at Aduthurai, Ambasamudram and Tirukuppam is also under the technical control of the Paddy Specialist. About 62 selections are pure lines and 10 hybrids. Nucleus seed distributed annually was 332,000 lb.

The paddy strains now under distribution are 10 from Aduthurai, 7 from Ambasamudram, 8 from Coimbatore 4 from Tirukuppam, besides introduction from other States as SR 26 B and BAM 3. The most outstanding and popular selections are :—

GEB.24 . . . . .	medium duration, good quality for nearly all districts.
CO. 25 . . . . .	for Blast affected areas.
Hybrids 6522 . . . . .	for good quality
Hybrids 38 . . . . .	for short duration.
Co. 25 (Madras) . . . . .	for long duration crop
BAM. 3 . . . . .	for semi-dry areas (Orissa)
Adt. 3 } . . . . .	for early crop (Kuruwai)
Adt. 20 }	
TKM. 6 . . . . .	Very good, short duration, cosmopolitan type for all districts.
Adt. 10 . . . . .	for Second crop.
Asd. 5 . . . . .	for Tirunelveli area.
S.R. 26B . . . . .	for saline areas (Orissa).
Co. 13 . . . . .	short duration variety.

Pure line selection is carried out for all important major varieties. Specific crosses for combining good characters using blast resistant and fine varieties are under trial, as also *indo-japonica* hybrids. About 2420 local types and introductions are under study. Besides manurial and cultural experiments suited to each tract, there are schemes for blast resistant varieties, drought resistant varieties financed partly by the I.C.A.R. The Team suggested the reduction of varieties and the use of mechanical means for winnowing.

#### MILLETS BREEDING STATION, COMBATORE

The station was started about the year 1923. The programme of work was to evolve strains for rainfed and irrigated areas of all millets for the major varieties. Important sorghum strains were :

Nature of crop	Varieties	Important Strains evolved
Rainfed	Periamanjai	Co1.
	Chinnamanjai	Co. 5
	Talaivirichjan	Co2, Co3, Co19.
	Irungu	K3
	Vellai cholam	Co12, Co18, K2.
Irrigated	Chitra Cholam	
	Sen Cholam	Co4.
	Fodder & grain varieties	Co11, Co9.

Strains are also being evolved for striga resistance. About 58,000 lb. of nucleus seed are annually distributed.

*Cumbu*.—An outstanding work is the utilisation of hybrid vigour to increase the yield of bajra. Three hybrids evolved, X1, X2 and X3 are now under spread and about 12,000 lb of hybrid cumbu are annually distributed.

Besides four other selections K1, Co1, Co3 and Co4 are suitable for both rainfed and irrigated condition under distribution.

*Ragi*.—This is a largely irrigated crop. About 10 varieties are under distribution and 35,000 lb. of nucleus seed distributed. All are suitable for irrigated conditions and four for rainfed areas also. AKP.2 is a cosmopolitan variety evolved at Anakapalli, Co6 is a cross and Co3 a mutant; Co7 is cosmopolitan and a good yielder. K2 is non-lodging and resistant to blast crosses are also tried for combining high yield with white grain, non-lodging habit with resistance to blast and for short duration.

*Other Millets*.—Three high yielding strains of Tenai, two in Varagu, and one each in Samai, Pannivaragu and Kudiraivali have been evolved. A number of crosses are being tried in these minor millets to combine good characters. Japanese varieties of Tenai are found resistant to rust. About 1,500 lb. of nucleus seed are raised annually.

*Pulses*.—The millets specialist also carries on research on pulses. One strain each in Red gram, horse gram, green gram and Bengal gram is being multiplied for the use of cultivators. Nucleus seed produced was 48,000 lb. of pulses during 1958-59.

The research work now conducted comprise cultural and manurial trials, varietal response to manuring, trial of exotic types, induced smut resistance, study of silica patterns and genetical studies.

The Team made the following suggestions:

- (1) More strains should be evolved especially for rainfed millets and small millets.
- (2) The hybrid cumbu production should be enlarged by having more areas allotted under the Specialists through the State Seed Farms.

### APPENDIX XIII

#### *Copy of the letter of the Ministry of Agriculture on the Report of the Seed Multiplication Team for Madras State*

(Letter No. F. 2-6/61-GMF(Co) dated 17th March, 1961)

**SUBJECT.**—*Seed Multiplication Team's Report on Madras State.*

I am directed to refer to your letter No. SMT/359/60-61 dated the 14th February, 1961, on the above subject and to say that this Ministry is generally in agreement with all the recommendations made by them Team. Our comments on some of the technical points are given in the enclosed note.

Comments of the Ministry of Food & Agriculture on some of the technical points on the report of the Seed Multiplication Team, in respect of Madras.

#### *Page 5 of Report—*

Breeding programmes for small millets and pulses have been recommended. This is very important but may not be productive of immediate results, since it takes about 5 to 6 years for evolving a strain and a few more years before it is recommended and made available for large scale multiplication and distribution. Pending stabilisation of achievement by orthodox routine breeding, some speedy method such as mass selection as an interim measure can be taken up under guidance of crop experts on a regional basis to meet specific local demands.

#### *Page 8 of Report—*

Frequency of seed renewal has been examined for different crops. The Team has commended annual replacement in largely or purely cross pollinated crops like Bajra and maize by use of Hybrid. This is in agreement with the recommendation of the Indian Council of Agricultural Research in its booklet on Multiplication and Distribution of Pure Seed of Improved Varieties. It has also been recommended by the Standing Expert Committee on Seeds. But actually in Madras during the Deputy Director (Seed)'s recent tour it was gathered that the State was to have seed renewal once in three years both for self-pollinated crops like Paddy and cross pollinated crops like Bajra (cumbu). The Standing Expert Committee on Seeds in its sixth meeting held at Chandigarh on the 24th and 25th July, 1959, had recommended that production of nucleus pure seed is to be about a fifth of the total area each in the case of predominantly self-pollinated crops and for the full area in the case of cross-pollinated crops. It is desirable that Madras sticks to this recommendation.

#### *Page 22 of Report—*

The Team has rightly stressed on the distinction between varietal and genetic purity. It has also reported that the only way of assessing genetical purity and identity is to grow samples of seed in the field and compare the performance of the plants. The Team has recommended drawing up definite specification for quality and purity at specific stages on multiplication and a strict adherence to such specifications. In this connection, the Team may perhaps be interested to know that for purity a percentage of 99 for 'A' class registered growers' stage and 97 for 'B' class registered growers' stage has been fixed by the I.C.A.R. (*vide* page 10 of the booklet on Multiplication and Distribution of Pure Seed of Improved Varieties).

#### *Page 27 of Report—*

Discussing working of the seed farms the Team is of the view that financial considerations of profit and loss should be taken as that sole criteria for planing the Seed Farm programme. This can be accepted with a proviso that nevertheless, cultivation sheets for improved crops varieties multiplied for seed on these farms are maintained as annual routine.

In the Appendix on case studies of State Seed Farms (Page 90 of the report) it would have helped towards a better comprehension of the usefulness of these farms had the Foundation seed produced in a particular year been followed up beyond that in subsequent years up to saturation. The Team could have made specific suggestions for improving the technical working of these farms.

*Page 38 of Report—*

In this connection attention is invited to the comments offered by this Ministry on Recommendation No. 1 (iv) in the report relating to Maharashtra State. (Reproduced below).

RECOMMENDATION NO. 1 (IV)

*Maharashtra State*

In this connection it is stated that the proposal for setting up Regional seed stores for meeting the needs of deficit States in items of emergencies like floods or droughts was considered in the year 1957-59. After referring the matter to State Governments it was proposed to set up in the first instance a Regional Seed Store only in the Punjab State which is generally a surplus State for wheat.

A Scheme was accordingly prepared at a cost of Rs. 43.30 lakhs for storing 2½ lakh mds. of wheat seed in Punjab. It was also approved by the Expenditure Finance Committee on the condition that it should be run on 'no profit no loss' basis. Punjab State was chosen because of the fact that it is only surplus State in wheat and the variety produced there could be grown in some of the other wheat producing areas of the country. Before the actual implementation of the scheme and the sanction of the amount the need for this was again considered and for the following reasons it was decided to drop the implementation of the scheme :—

1. The demand for wheat seed from such areas as are prone to crop failures might arise once in 5 years and it would not be worth-while to purchase the seed every year and stock it in ordinary godowns in Punjab to be damaged by rodents and pests ;
2. It was felt that the seeds of Punjab varieties (which were proposed to be purchased under this scheme) would not suit all other wheat growing states. Though such seeds will no doubt give some crop when introduced in other areas, it was thought that the crop raised from them will never equal a normal crop ;
3. It would not be possible to run the scheme on 'no profit no loss' basis because it would be possible to sell the seed at a higher rate than the purchased rate only in these years when the purchased wheat is used as seed. In other years the stock will have to be disposed of at ordinary market rate after paying the premium which has essentially to be paid for grain purchased for seed purposes and in those years there is bound to be loss. It was also considered that the profit of one year will not off-set the loss likely to be incurred in other years.

## APPENDIX XIV

### *Action taken and comments made by the Madras Government on the recommendations of the Seed Multiplication Team regarding Madras State*

*Extracts from Letter No. 172205 F IV/60-13, dated 29-5-61 to the Secretary, Seed Multiplication Team from the Secretary to Govt. of Madras (Agriculture) Shri A. Venkatesan*

*F. & A. (Fiv.) Dept.*

The Team for the study of Seed Multiplication Schemes, organised by the Government of India visited the various places in State during the period from 9th July, 1960 to 16th July, 1960 and sent a report regarding the working of the Seed Multiplication Schemes in this state. The Team has made 17 recommendations and has requested to be informed as to how far these recommendations have the concurrence of this State Government.

2. The recommendations made by the Team and the action taken or proposed to be taken on them in consultation with the Director of Agriculture are indicated below :--

#### *Extracts*

Recommendation	Action taken or proposed to be taken in consultation with the D.A.																		
1	2																		
(1) The phasing of the improved seed programme may be carried out with the following priorities in the order of importance:	Cholam, Ragi and Cumbu crops form the major millet crops of the State covering about 40 lakhs of acres out of 55 lakhs on millet crops. The estimated coverage already made under the improved seed distribution scheme in all millets is 40%. The minor millets like, Tenai, Varagu, Sami, Pani Varagu, which are mostly grown under rainfed conditions are generally grown in comparatively poor type of soil in this State. There are no sufficient improved strains in these millets to replace the local ones. Above are the difficulties in bringing larger areas in minor millets. The evolution of improved strains in respect of different millet crops is in the process. The coverage as estimated by the Millet and Pulses Specialist, Coimbatore in 1959-60 administration report under the major millets is as follows :—																		
(i) Coverage of 75 percent of the area in pulses and minor millets by the end of the Third Plan Period.	<table><tr><td>Cholam</td><td>.</td><td>.</td><td>.</td><td>.</td><td>54.7%</td></tr><tr><td>Ragi</td><td>.</td><td>.</td><td>.</td><td>.</td><td>73.4%</td></tr><tr><td>Cumbu</td><td>.</td><td>.</td><td>.</td><td>.</td><td>57.6%</td></tr></table> Suitable improved strains for the uncovered area will be attempted to be released during the Third Five Year Plan to cover about 50% of the cultivable area of the State. It has also been proposed to have mass selection of local strains to bring about larger coverage till improved suitable strains are evolved.	Cholam	.	.	.	.	54.7%	Ragi	.	.	.	.	73.4%	Cumbu	.	.	.	.	57.6%
Cholam	.	.	.	.	54.7%														
Ragi	.	.	.	.	73.4%														
Cumbu	.	.	.	.	57.6%														

- |   |  |
|---|--|
| <p>(ii) Mapping out fresh areas for distribution of seed of already popular strains of paddy, cotton Sorghum, etc. through an intense planned coverage of new villages and new ryots to saturate the entire area by the Second Plan Period.</p>                             | <p>This is already being implemented from 1-4-61, the Panchayat Administration will be entrusted with the responsibility of procurement and distribution of improved strains of millets &amp; seeds in every village. Under this scheme 1/3 the area of every village is proposed to be covered every year and with new ryots, nominated by Panchayat.</p>                 |
| <p>(iii) Village Panchayats shall be made to ensure that improved seed of major crops reaches each village and if not to arrange for its supply from the district staff. This will ensure absolute village coverage.</p>  | <p>This is already taken up for implementation from 1.4.61 in respect of paddy, cholam, ragi and cumbu. The Government have already passed orders that village Panchayat will be taking the distribution of improved seed through Gramasahayas from 1-4-61 under the Panchayats administration.</p>  |
| <p>(iv) Creation of an All India reserve of improved seed of selection crops to meet emergencies of crop failures due to floods, droughts etc.</p>  | <p>It is for the Govt. of India to elicit the views of other States and formulate a Scheme. The recommendations of the Team for the study of seed multiplication schemes is being forwarded to the Govt. of India for necessary action.</p>  |
| <p>(a) In the case of State Seed Farms :</p>  |  |
| <p>(i) The future size and the existing size wherever suitable may be increased to 100 acres for each farm as this will reduce working costs per acre and give more scope for multiplying crops like pulses, groundnut and millets where foundation seed is inadequate.</p> | <p>This recommendation is already in vogue in this State. The size of the State Seed Farms in suitable localities with the required facilities have been extended to 75 to 100 acres of contiguous blocks to form economical units from the point of view of production and management besides the working costs.</p>  |
| <p>(ii) The practice of leasing lands for the purpose of establishing Seed Farms may be stopped as it adds to working costs and hampers permanent improvement.</p>  | <p>The Government have since revised their policy in the matter of acquiring suitable areas for the purposes of State Seed Farms and steps are being taken to acquire the existing State Seed Farms which are satisfactorily functioning on lands requisitioned under the Act. In future also lands will be taken and acquired on seeing its performance for a period.</p> |
| <p>(iii) Unassigned Government lands may be got as far as possible as this will reduce capital cost and also provide for reclamation and expansion as desired.</p>  | <p>This recommendation is already in vogue in this State. Suitable poramboke lands where available are being taken for purposes of State Seed Farms. So far 47 such farms have been opened in Government lands and necessary reclamation works carried out to bring the same to cultivation suitably.</p>  |
| <p>(iv) Large farms of about 100 acres each amounting to in all about 1000 acres to may be acquired near or in the vicinity of agricultural stations in rainfed areas especially</p>  | <p>This is attempted in the case of Zonal Nucleus Seed Farms in Groundnuts as far as feasible and suitable land is available. The groundnut crop is also rotated with millets and pulses and also other oilseeds. The following are the</p>  |



for growing groundnut, millets and pulses, where the tempo of foundation seed production has to be increased and they may be kept under the control of the concerned research Stations.

5 such zonal Nucleus seed farms which are located adjoining the Rice Research Station and the Agricultural Research Station itself.

1. Tindivanam (South Arcot).
2. Bhavanisagar (Coimbatore District).
3. Pollachi (Coimbatore District).
4. Chittalandur (Salem)
5. Srivilliputtur (Ramanathapuram).

The lands in the Zonal Nucleus Seed Farm are taken on lease and the extent being 50 acres and more.

- (3) A periodical survey for the spread of improved varieties for all crops, is necessary as was done in Paddy and millets. It is suggested that a sample survey of one village for every 3,000 acres of cropped area will give adequate information practically for all crops.

This is acceptable. The Extension Specialist at Coimbatore has been instructed to undertake the survey of all important crops in the model already done.

- (4) It is necessary to have seed testing stations to get useful knowledge regarding the behaviour of different seeds under storage, handling and distribution in regard to dormancy and viability. The Madras Scheme for the establishment of regional seed testing stations and laboratories with provisions for field testing submitted for the Third Plan may be approved as also similar schemes from other States also, as this will help considerably to improve the quality of seeds distributed. These schemes may be co-ordinated with similar schemes in the Centre. The practice in Madras of using tetrazolium bromide for quick germination test in paddy and cotton may be extended to other States.

The D.A. has stated that the Scheme for the opening of the Seed Testing Station in the State was not approved by Government for want of funds. It is proposed to reconsider the question.

- (5) The system of State Seed Farms which has succeeded in nearly meeting the targets for paddy may be expanded to meet the full needs of other crops by the end of the Third Plan Period.

This is being attempted as far as possible. In millets also this is expanded to meet the needs. In Cotton and groundnut, inner stages or multiplication is carried out in State Seed Farms. Based upon the total area under important crops of the state it has been decided to have 210 State Seed Farms of 25 acres each and up to this extent seeds of important crop are multiplied.

- (6) More facilities like proper seed store, threshing and drying floors have to be provided and special equipment for cleaning grain and receptacles supplied. This is being provided already as and when farms are required. 22 Seed stores with threshing floors have been constructed already, 2 are under construction, 40 are proposed to be taken up soon. (Total 64).
- (7) The village Seed farm system which has proved successful for covering large areas under paddy is considered best for future saturation of the whole area with major crops by the Second Five Year Plan Period and for the minor crops in the Third Plan Period. It should be extended to cover every village with improved seed. In this connection, the team recommends the implementation of the proposal under consideration of the Madras Government to have Gramasahayaks for every village to act as village Leaders, model small farm cultivators and secondary produce of improved seed. This Government have already sanctioned in G.O. No. 3792 Food and Agriculture dated 16-11-60, the scheme for entrusting the production and distribution of improved strains of paddy and millets seeds in villages to the respective Panchayats. Under the Schemes the Agricultural Department will cater the needs of the Panchayats in the matter of primary seeds. The Panchayat will distribute these seeds to selected growers in the village who are to be designated as "Gramasahayaks". The maximum area per gramasahayak for the village seed production has been limited to 3 acres. These Gramasahayaks are eligible from the respective Panchayats a premium of Rs. 2/- per maund of improved seed produced and actually distributed to the nominees of the Panchayats in the village. The Secondary seed multiplied by the Gramasahayaks will be sold to growers nominated by the Panchayats at reasonable seed market rate fixed by the Panchayats.
- (8) For conducting plot trial more adequately and also expanding the scope of testing seeds at all stages, one Assistant specially trained may be posted for work with each District Agricultural Officer. In view of the recommendation No. 9, which is under consideration of this Government it is proposed not to take any action on this recommendation.
- (9) The work of seed Development Officers in testing seed and helping State Seed Farms work should be amplified by providing provision of more assistant staff if necessary, so that all registered seed can be fully tested before distribution. The D.A. has recommended that one Seed Development Assistant may be given to each of the District Agricultural Officers for the purpose. He considers that there is no need to increase the number of Seed Development Officers, as even the existing four posts may well be merged with the District Agricultural Officers with the reduction of Jurisdictions of the District Agricultural Officers to that of Revenue Divisional Officers during 1961-62. It is proposed to agree with the view of Director of Agriculture.
- (10) The seed testing and development Officers may be recruited from the crop Specialist Staff and the extension officers from the District staff. This may be considered when full equipped seed testing laboratories are established with facilities for both field and laboratory tests as per recommendation No. 4 above subject to availability of suitable lands.

1	2
(11) For providing more efficiency and output in the developmental blocks, it is recommended that an Officer of the Status of a District Agricultural Officer be posted for groups of blocks and Agricultural Extension Officers placed under him.	This may not be necessary when it is proposed to reduce the jurisdiction of the District Agricultural Officers to that of Revenue Divisional Officers.
(12) The Technical direction at the highest level of the Agricultural Department is recommended to meet the needs of seed Distribution and other associated activities.	This is already in vogue in this State. A Joint Director of Agriculture is already incharge of the technical direction at headquarters.
(13) In order to get the full benefit of their knowledge and experience distinguished crop specialists engaged in the production of improved seed should be retained in the line by improving their prospects, instead of letting them take to administrative posts carrying higher salaries and men of approved merit to give expert attention to seed work.	The principle is accepted subject to need and suitability. Retention of Research Officers in the same line may be considered and not posted to administrative post. Suitable action will be taken as and when necessary.
(14) More contact between the Specialists and ryots is necessary to correlate the basic seed problems of the latter with the fundamental research programme of the farms. Special facilities should be provided for this by frequent tours in the villages.	This is necessary and steps are taken already to promote more contact between the ryots and the Specialists by holding Farmers Day Celebration, Seed Day Celebration and the like every year, so that progressive cultivators can have the opportunity of assembling at a place and give vent to the problems in cultivation of crops and get the advice of the Specialists concerned. The Specialists also visit villages when any specific problem arises for solution. The Director of Agriculture is being asked to instruct the specialists to have more frequent visits to the villages.
(15) State Trading in seed has been considerably reduced by the system of the State Seed Farms, Supplemented by the village seed farm system of distribution of seed from seed farm ryots to other ryots. Restricting State Trading to a minimum can improve the efficiency of seed work. Arrangements must be made to dispose of unsold stocks of one year rapidly under	The State Trading has been considerably reduced and Panchayats or cooperative are encouraged to take up seed distribution work in village. The District Agricultural Officer are taking suitable steps to dispose off the unsold stocks of seeds of over one year. Deputy Director of Agriculture are also given limited power to dispose of unsold stock.

clear technical administrative advice so that disciplinary proceedings against subordinates can be avoided or reduced to a minimum.

- (16) In Maharashtra, the practice exists of sending out protracted seed from Agricultural Stations on orders packed in cloth bags in small quantities to ryots, when the supply to State Farms has been completed. This practice is recommended for adoption in Madras to ryots in new areas, so that the supply can be used only as seed, and without affecting the general programme of large scale distribution.
- Distribution of improved seed at Village level is made through the Village Seed Farm Growers or Gramasahayaks of the village. The seed produced in State Seed Farm is meant to meet the needs of Gramasahayaks. Hence the recommendation is not feasible of adoption in this State.
- (17) Large scale distribution can be effected only if every village gets improved seeds. This aspect should be emphasised at every stage of multiplication and distribution and all steps directed to that end. Foundations for seed work should be laid in the villages. For this purpose more ryots in the villages need to be educated to appreciate the value of good seed by actual trials and demonstration in the villages, particularly those not covered by improved strains. Village Panchayats and Gramasevaks should be made to help in this work. The aim in seed distribution should be to saturate whole villages with improved seed as rapidly as possible. Along with such saturation, there must be a regular and continuous follow of pure seed into the village so that each ryot can renew his seed once in three to five years depending on the crop he grows.
- This is already done. The village Panchayats will be in charge of the production and distribution of improved seeds of secondary stage at the village level based upon the principle of coverage and the need to cover 1/3rd area every year with renewal of seeds with fresh waves of improved seeds.

# APPENDIX XV

## Income and expenditure of State Seed Farms Madras State 1959-60

Sl. No.	District	Name of Farm	Area in acres	Acquired (A) Leased (L) or Government (G)	Recurring expenditure				Receipts Rs.	Value of balance stock of seed over previous stocks of Seed. Rs.	Profits or loss after allowing value of balance stocks of Seed. Rs.	Rs. Loss	Remarks
					Establishment Rs.	Cultivation Rs.	Total recurring expenditure Rs.						
1	2	3	4	5	6	7	8	9	10	11	12	13	
1.	Chingleput	Uthukothai	23.5	A	1563	10060	11623	15901	356	4634	..		
2.		Kolandalur	50.7	A	4805	14877	21118	23355	880	3117	..		
3.		Sirukaveripakkam	50.4	A	4752	14736	19488	15811	9201	5524	..		
4.		Modaiyur	31.3	L	4630	14334	18964	10349	1598	..	10206		
5.	North Arcot	Athiyandal	49.7	A	6500	8386	14885	17701	3473	6290	..		
6.		Kilnarma	41.8	L	4923	20194	25117	11737	6958	..	6423		
7.		Marudadu	49.9	L	4628	27059	34687	25110	3089	..	9666		
8.		Vazhagachanur	196.4	G	..	..	..	..	..	..	..	..	Recently opened (17.3 60)

1	2	3	4	5	6	7	8	9	10	11	12	13
9.	South Arcot	Vanut . . .	49.5	A	6497	18928	25425	28136	11110	13821	..	..
10.		Vandarayanpet . . .	46.6	A	4362	11610	16072	23112	1	7041	..	..
11.		Sathisthope . . .	46.9	A	9327	4307	7634	8431	449	1246	..	..
12.		Velpakkam . . .	53.7	L	6107	42287	48394	40099	452	..	7842	..
13.		Vadakkannandal . . .	46.3	L	4573	29134	33707	12877	3949	..	36880	..
14.		Nedveli . . .	46.2	L	2684	29340	34024	16966	5341	..	11717	..
15.		Kakuppam . . .	30.3	L	4945	41634	46579	30265	3316	..	19630	..
16.	Thanjavoor	Nagamangalam . . .	52.7	A	4098	14299	18397	23681	7238	12521	..	..
17.		Marudanalkur . . .	30.0	A	2506	10638	12044	49352	11933	18341	..	..
18.		Sakkottai . . .	30.9	A	2306	8050	10356	13145	7164	11953	..	..
19.		Kaschnikudikadu . . .	51.3	A	3485	11856	15322	24959	..	8997	..	..
20.		Deevombalpattinam . . .	52.0	A	4530	11602	16132	27062	53	10983	..	..
21.		Veeranthi . . .	54.4	A	4332	12489	17022	30364	6946	20288	..	..
22.		Nedumbalam . . .	50.0	A	4910	10484	15395	28924	—319	13210	..	..
23.		Veppankulam . . .	13.8	G	3407	5942	9349	35	2137	..	7177	..
24.		Orathur . . .	49.9	L	4277	22716	26993	44109	—15272	1845	..	..
25.		Namasivayapuram . . .	49.9	L	4478	26611	31089	26031	15779	10722	..	..

26.	Mahadaupuram .	51.0	L	4333	23360	27693	17957	4751	..	4984
27.	Kondathur .	50.2	L	3576	16403	1979	14948	2012	..	3019
28.	Thirukadayur .	49.4	L	4575	19987	24562	15970	—5863	..	14455
29. Tiruchirappalli	Tiruvarangalam .	48.1	A	4389	7366	11756	6546	—174	..	5383
30.	Anmekkuddy .	13.8	G	..	..	..	..	..	..	Recently acquired.
31.	Vengaukurichi .	69.0	L	4223	9158	13381	13856	..	476	..
32.	Marudur .	29.5	L	..	21650	21650	12780	7856	..	973
33.	Tirukampuliyur .	31.0	L	2554	9619	12173	14905	3642	6374	..
34. Coimbatore	Kannampalayam .	49.5	A	5245	23643	28888	20789	3722	..	4378
35.	Sathyanangalam .	41.4	G	..	324	324	20	2655	2351	..
36.	Pongalur .	22.5	L	4243	23285	27528	28924	—5241	..	3846
37.	Veeraberalam .	42.5	L	6214	26666	32480	19904	—8980	..	21956
38.	Bhavani. .	108.5	L	7129	81090	88219	77288	—72	..	10999
39. Salem .	Mulluvadi .	70.0	G	2216	2815	5031	354	8907	..	4370
40.	Papparampatti .	45.8	L	3653	17088	20741	16312	376	..	4052
41.	Naduinampatti .	43.0	L	4949	23690	28639	15318	..	..	13321
42. Madurai .	Kappalur .	38.1	L	5040	7290	12330	8654	—1760	..	5436
43.	Ayyalur .	49.6	L	4917	17579	22496	17556	—3837	..	8776

1	2	3	4	5	6	7	8	9	10	11	12	13
44.	Ramanathapuram Udayachi	.	200.0	G	2334	5666	7600	255	5416	..	1929	
45.	Pullur	.	48.9	L	4228	18760	22889	15675	223	..	6991	
46.	Davādanam	.	52.1	L	5223	23691	28904	48474	579	20150	..	
47.	Moriyur	.	44.5	L	3872	13427	16999	35	1850	..	15115	
48.	Kanyakumari	.	50.7	G	5229	13847	18886	25072	3371	9557	..	
49.	Nilgiris	.	51.0	A	2223	41795	44377	62081	—9479	8231	..	
50.	Thumanatty	.	24.6	G	2223	41888	44471	46013	—941	601	..	
51.	Kakathope	.	18.5	G	2500	40194	42635	98936	—1780	..	5478	
52.	Kurthukuly	.	75.6	G	4155	65274	69429	112270	..	42841	..	
53.	Vyanagam	.	34.3	G	3578	46665	50244	75796	6482	32094	..	
54.	Killur	.	38.9	L	2810	12464	15274	7070	—2030	..	10234	
55.	Tirunelveli	.	81.0	L	6595	89256	95851	99377	—10471	..	6944	





सत्यमेव जयते

## STUDIES MADE BY THE SEED MULTIPLICATION TEAM

The Seed Multiplication Team undertook studies of the Seed Multiplication Farms in the following States and made separate reports on them :

1. Himachal Pradesh
2. Madras
3. Mysore
4. Madhya Pradesh
5. Maharashtra
6. Rajasthan
7. West Bengal
8. Punjab.

Besides its reports on individual States, the Team also made an All-India Report. All these reports are being published.



सत्यमेव जयते



सत्यमेव जयते